

**All you want to
know about the
BBC MICRO!**

THE MICRO USER

Volume 1
Number 10
December 1983
£1

**Drop in
on the
BBC Micro
User Show**

**Westminster
Exhibition
Centre**

December 8 to 11

**Page graphics:
6845 revealed**

**Beginners' guide to
string handling**

**Three BBC chess
packages reviewed**

**PLUS LOTS OF
LISTINGS:**

**Fly Santa's Saucer . . . meet the
pixels on your Christmas tree . . .
make your BBC Micro the star
of your Christmas party . . . and
pit your wits against the Phantoms
of Tower Bridge**

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**a Micronet
modem and
subscription in
this month's
contest**

**Another free
issue inside!**

**electron
user**

Software for the BBC micro

32K
Chess



£8.95 incl.

Excellent use of the high-res graphics help to make this the most flexible chess game available. A choice of hundreds of different skill levels control the playing strength. This game has been continually updated over the past few years and this later version incorporates a host of new facilities, including the ability to: change the board and piece colours; replay a game, move by move; change levels whilst playing; ask the computer to suggest a move; force the computer to make a move at any time; save a game on tape or disc; blitz play within a time limit; mate in 2, 3 or 4 moves; castle and en passant.

Quite simply the best chess game available for the BBC Micro.

32K
Android
Attack



£8.95 incl.

You are in the middle of a maze being chased by various androids, your only weapons being your hand laser and a quantity of land mines. These mines can be dropped at any point in the maze and later detonated under remote control. Beware of the "Smiley" master android and watch your oxygen levels — the lower the level the slower you move. Many different skill levels and a high score table.

"The graphics and colour in Android, are excellent and the game has an appeal which is unique . . . One of the best games to appear recently . . ." Your Computer.

32K
Swarm

Score: 198



£8.95 incl.

A formation of attacking birds control the sky. Your aim is simply to destroy the birds, bombs, eggs that hatch into diving eagles, this action packed game features exceptionally smooth graphics and novel sound effects. Joystick or keyboard operation.

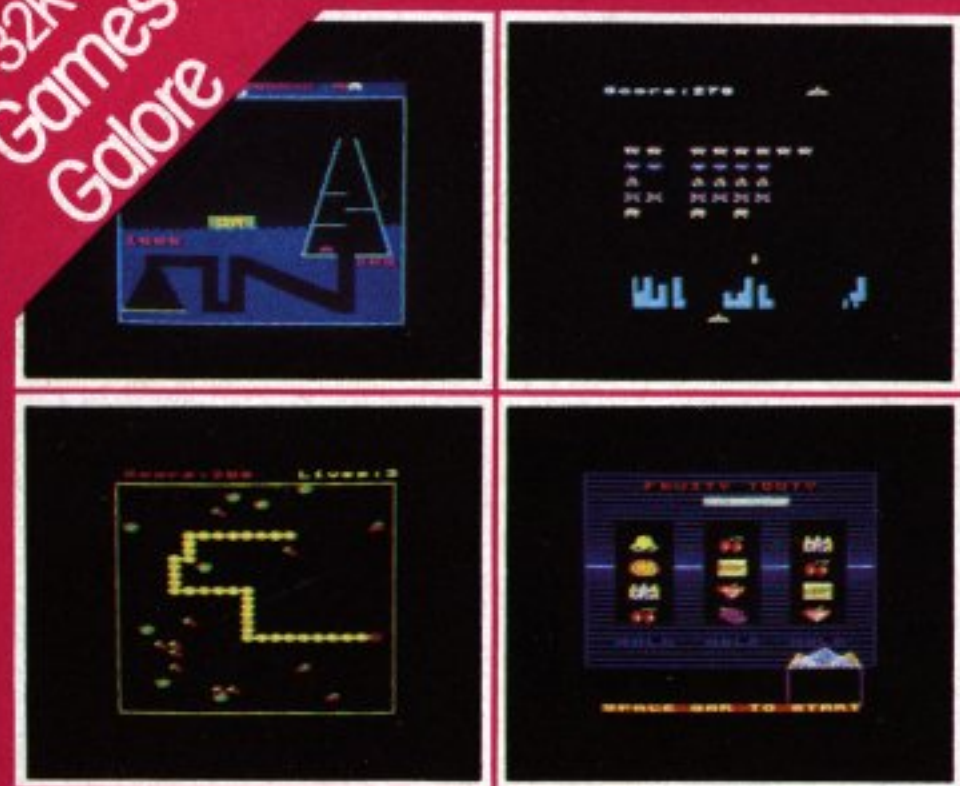
32K
Draughts



£8.95 incl.

From the same author as our best selling Chess program, this game incorporates many of the features of that program — various skill levels, save a game to tape, replay a stored game, etc. etc. A high resolution colour display (the user may change the colours) and an option to choose the rules of play make this game extremely flexible. Works with all Operating Systems.

32K
Games
Galore



£8.95 incl.

One cassette containing 4 arcade games.

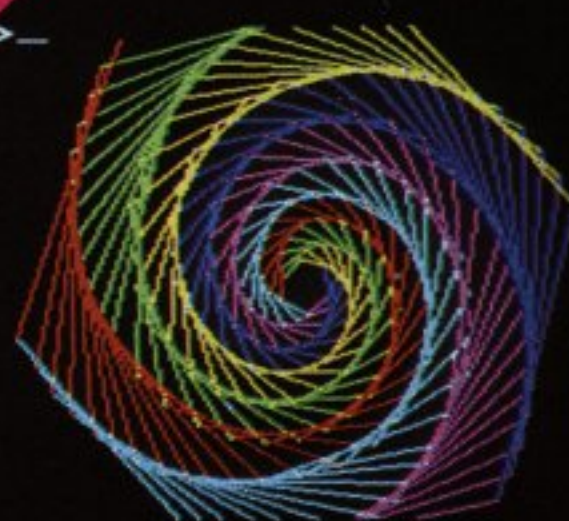
LOONY LANDER — Controls the rockets of a lunar landing craft as it descends to the moon surface. Try to land in one of the three permissible landing spots.

SPACE INVADERS — A fast machine code implementation of this old favourite.

FRUIT WORM — Controlling the direction of the worm, the object of the game is to eat the fruit that is littered over the ground but not the vegetables. The more you eat, the longer you become.

FRUIT MACHINE — Good sound effects and realistic high resolution graphics make this the best "One arm bandit" stimulation around. This tape represents exceptional value for money as it contains 4 full feature games normally selling as separate tapes costing £7.95 each.

32K
Logo 2



£11.50 incl.

One of our most popular programs to date. This is not a game, but an introduction to the LOGO graphics language that has become so popular in schools. It incorporates the 'turtle' graphics and many other features common to all LOGOS. Fascinating patterns or other graphics work can be built up very easily using the set of inbuilt commands. The command set can be extended by adding new 'words' to its vocabulary based on the existing set. Logo 2 can be used as a very simple graphics aid for young children, but it can incorporate more advanced ideas — defined procedures, sub-routines, loops and even recursive programming. Supplied with full documentation.

CASH OR ROYALTIES. We specialise in quality software for the BBC machine and can offer the best rates around. We are always interested in obtaining new programs to add to our range and offer either a cash payment for the outright purchase or alternatively pay a royalty on each one sold.

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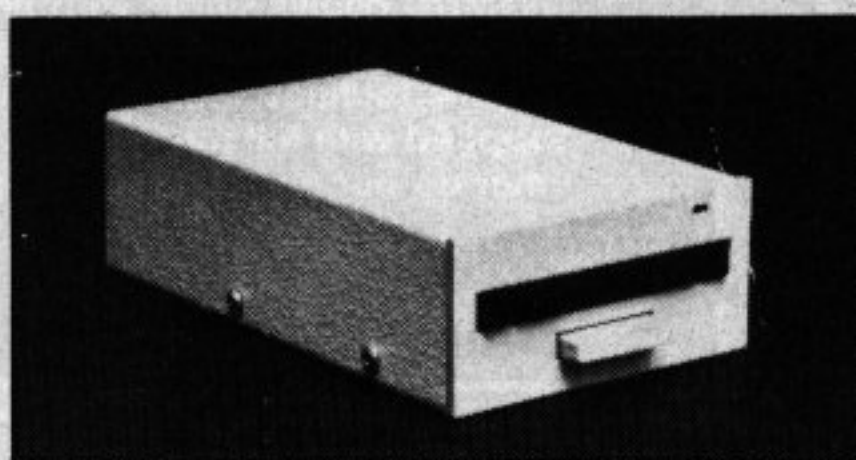
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the eject button. A unique feature of the new disks is a mechanical tab which prevents overwriting of precious data. And of course, you can switch it back when necessary.



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The disk drive provides a track-to-track access time of only 3mS, much faster than old fashioned drives.

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Excellent Manual

Included with your drive will be an easily understood 80pp user guide, with full explanation of the BBC Disc Filing System (DFS).

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If there isn't a stockist near you — just fill in the coupon below, and we will send your order with our full no-quibble money-back guarantee or ring (0925) 62907 for 24 hour service.

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Japan, home of the major disk drive manufacturers, has decided to make the new 3" disks a standard. And no wonder. Not only are they strong and easily stored, they give 100K per side, and you simply flip them over in the same way as a music cassette. The small light on the casing reminds you which side you are using.

The disk is totally encased in rigid plastic, with no exposed surfaces, is easily inserted with one hand and simply removed by pressing

A+B Computing (Sept) stated — "excellent manual" ... "its simplicity of use must recommend the Hitachi 3" drive to anyone about to purchase a disk drive" ... "the microdisk is a marvellous change" *Personal Computer News* "protective sleeve and hard plastic exterior provide for greater protection" ... "far more durable and easy to handle than normal drives"

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Please allow up to 28 days for delivery. **BBM 12**

ROMS

SOFTWARE FOR THE BBC MICRO

WORDWISE

(C) Computer Concepts 1982

- 1) Save entire text
- 2) Load new text
- 3) Save marked text
- 4) Load text to cursor
- 5) Search and Replace
- 6) Print text
- 7) Preview text
- 8) Spool text

ESC Edit Mode

Please enter choice_

WORDWISE

32K

The renowned word processing package. Still clearly the market leader with sales now over 20,000. This has become "the standard" word processor for the BBC Micro and is still receiving very favourable reviews. Wordwise will work with tape, disc or Econet and includes automatic word counting and full control over text entered into the system. Supplied with a detailed spiral bound manual and an excellent free typing tutor program. After 8 months on the market there is still no other product as simple to use and as powerful as Wordwise.

£39.00 + £1.00 p&p + VAT

GREMLIN

32K

The GREMLIN system is a powerful de-bugging tool for 6502 machine-code programs. It includes all the usual features found in good machine-code monitors, such as memory search, intelligent memory move routines, memory editors etc. These work at byte, word or string level. A built in help menu can also be displayed at any time.

This ROM contains many more unique features such as an assembler as well as a disassembler. An extremely powerful expression evaluator is included allowing complex expressions to be entered in a format that is only normally available in high level languages. Variables are also allowed (any length) and may be included into expressions.

GREMLIN allows single stepping through machine-code programs. It is also possible (on to a printer or disc) to single step through graphic routines without disturbing the screen.

Supplied with full manual, this 8k ROM has more features than any other de-bugging package for the BBC machine.

£28.00 + £1.00 p&p + VAT

```
DISC DOCTOR 1.07
DIS <<ata>> <<end>> <<ofs>>
DISCTAPE <afsp> <<afsp>>
DOWNLOAD <fap> <<adr>>
DSEARCH <str> <trk> <<trk>><<sct>><<drv>>
DZAP <<trk>> <<trk>><<sct>><<drv>>
EDIT <<key no.>>
FIND <str>
FORM <drv> <no. trks> <<stt>> <<S>>
JOIN <fap> <afsp> <<afsp>>
MENU <<drv>>
MOVE <<dest page>> <<src page>>
MSEARCH <str> <<adr>>
MZAP <<adr>>
PARTLOAD <fap> <ofs> <ext> <<adr>>
RECOVER <trk> <<sct>> <<sct>> <<adr>> <<drv>>
RESTORE <trk> <<sct>> <<sct>> <<adr>> <<drv>>
SHIFT <<src>> <<dest>> <<ext>>
SWAP <<drv>>
TAPEDISC <<fap>>
VERIFY <<drv>> <<no. trks>> <<stt>>
```

OS 1.20

Press any key_

DISC DOCTOR

32K

This utility package has many special features for use with discs but also contains many other utilities that everyone will find useful: Function key editing, powerful disassembler, recovery of any data from the disc, merging of files, complete disc editor. Compatible memory editor, String search in memory or on disc, automatic tape to disc and disc to tape routines, built in help menus, formatting of 35, 40 and 80 track discs, and also a special format that allows 60 files per disc.

£28.00 + £1.00 p&p + VAT

TERMI - BBC TERMINAL PROGRAM RELEASE 2.0

(C) FROM COMPUTER CONCEPTS
D.J. Martin and M. Miles 1983

----- Function key definitions -----

| Key No. | Key use | Key with SHIFT | Key with CONTROL |
|---------|-----------------|----------------|------------------|
| f0 | Printer | Start | Stop |
| f1 | Change Mode | 80 char | 40 char |
| f2 | Spooler | Start | Stop |
| f3 | Transmit file | Start | Abort |
| f4 | Transmit file | Pause | Continue |
| f5 | Simulate | Custom | 80C |
| f6 | Get handshake | ON/OFF | None |
| f7 | Special funct'n | OSCLI | Set Mask |
| f8 | Special Options | Full/Half | Parity |
| f9 | Reset | Soft | Hard |

SHIFT/CONTROL FUNCTION KEYS

| | |
|----|-------------------|
| f0 | Print Screen. |
| f1 | Mode 7 |
| f9 | Reset XMIT block. |

TERMI

32K

This program enables the BBC machine to act as an advanced terminal when connected to another computer or to a modem via the RS-423 (RS-232) interface. This provides facilities to transmit data from disc and the spooling of data from the 'line' to the disc or printer.

Termi has 3 modes of operation — dumb terminal, BBC graphics terminal and customised intelligent terminals including DEC VT52.

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***Forthcoming
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**COMPUTER
CONCEPTS**



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ARE YOU SERIOUS?

STOP PRESS – REPLICA II NOW AVAILABLE

In addition to the features below it also works with Acornsoft "locked" programs plus very long programs (HEX & E00 to 7B00)

REPLICA II and THE KEY give you, the user, what you want. You have bought your disc drives and now want to take advantage of them, but most of your favourite software will not run with the disc interface and even if you are prepared to pay out for disc versions of everything you can't get them and if you have 80 track drives you might as well give up. If you know everything about the DFS, memory locations, saving procedures etc, you can probably save some of them onto disc. What's a half hour per program, and it only takes a few minutes to find, load and relocate it each time (if you can remember the sequence).

On the other hand you could buy REPLICA, enter a few details i.e. 1) program name, 2) number of sections, 3) CHAIN, *RUN or *LOAD 4) press play and then make a cup of tea whilst the program loads from cassette for the last time. When you return the program will be on the disc and shown in a menu under the name you gave it. There are now only two alternative storage methods required and one of them will work with most programs. There are some exceptions to REPLICA II but the number is insignificant. Many users have purchased 4 or 5 copies of REPLICA and it is now the recognised format that dealers use to display their software.

REPLICA II will now hold up to 16 programs on each disc, they can be erased if required and a new batch saved, but why not just buy another REPLICA and keep your programs on disc permanently (it only costs approx. £1.00 per program).

REPLICA II **£12.00** (state 40 or 80 track)

THE KEY

THE KEY provides you with the facilities that should have been included in the Disc Filing System and also helps you reach the parts other discs can't reach. This new version of THE KEY has been made compatible with ECONET at the request of many schools, colleges and universities. The whole program has been turbocharged and the facilities are:

- 1) FORM40 – now much faster.
- 2) FORM80 – now much faster.
- 3) BACKUP – has that effect on some people because it allows even most of the protected discs to be backed up – faster too.
- 4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
- 5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY **£12.95** (state 40 or 80 track)

Ring to check
compatibility if you
are NOT using
Acorn DFS.
**Hotline 06065
51374**

GRAFKEY/GRAFDISK

The first and best CAD program for the BBC Micro. Used in education, business, art, video etc. Recommended by LASERBUG, BBC MICRO USER, PCW, SOFT and thousands of satisfied users (see earlier issues of BBC Micro User for screen pictures). In a comparative review of the major CAD programs PCW said: "Considering the options it is by far the best value". Need we say more, if you need a graphics utility then this is it.

GRAFKEY (joystick & keyboard) **£9.00**
GRAFDISK (state 40 or 80 track) **£12.95**

SHADOW

A tape cloning program that will enable you to make security back ups of your valuable cassette based software.

SHADOW works with 99% of all known programs including those with "locked" sections or those containing 300 BAUD sections. Handles programs of any length and works with any operating systems.

SHADOW is the definitive tape backup system. Also on the same tape is a very useful program called "INSPECTOR" which allows the user to page through memory, search for a string, etc.

BOTH PROGRAMS £8 incl.
(This program for personal use only).

JOYSTICK UTILITY

Converts non-joystick programs to work with joysticks. Works with any program using INKEY(-), which applies to most programs. Easy to use, just press the keys you want to transfer. Supplied on cassette but can be transferred to disc.

CASSETTE £6.00

SINGLE KEY ENTRY

Requires 1.2 O.S.

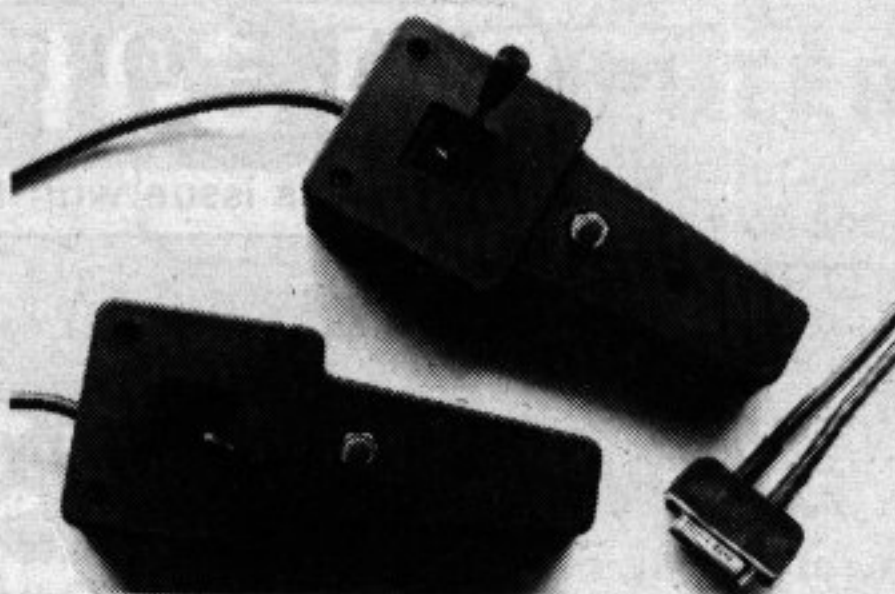
A very useful utility that provides single key input of 66 key words. Just like having 66 function keys. Compatible with issue 1 & 2 basic and discs.

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JOYSTICKS

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joysticks of compact and
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(for the 5-11 age group)

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PROGRAMMERS

We are constantly seeking new and interesting programs. Why not send yours for appraisal? You have got nothing to lose but much to gain – So why not send your program today? 40 track disc if possible or two copies on cassette. In some cases we will even provide disc drives against future royalties.

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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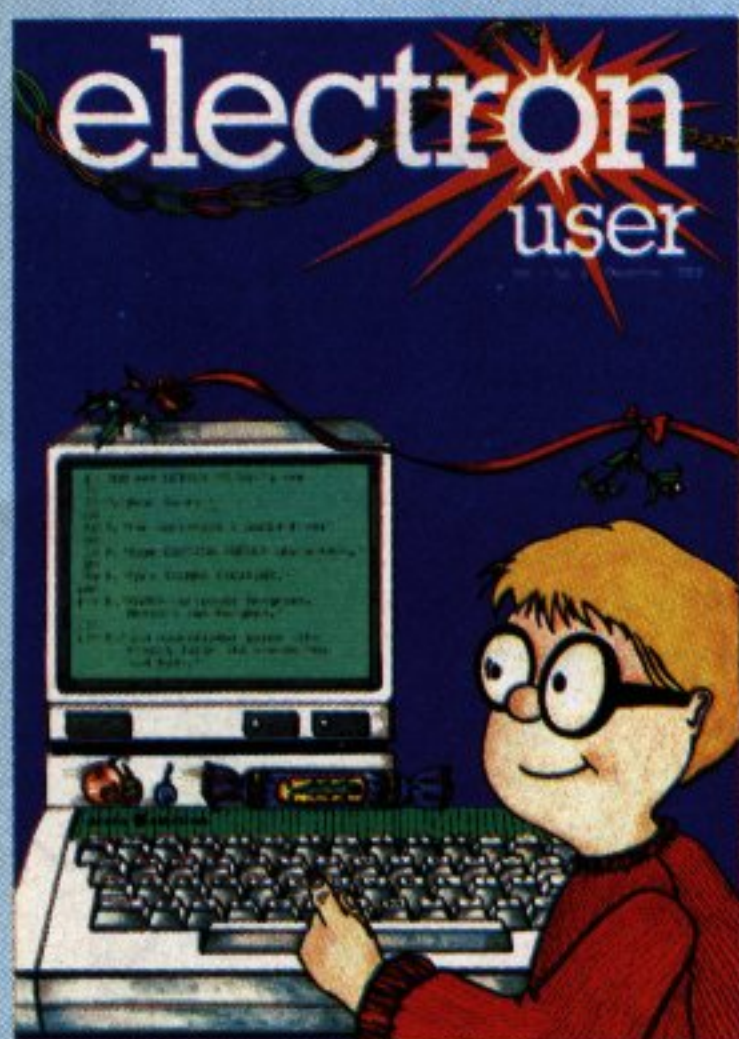
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A chance for three lucky readers to win themselves a year's access to Micronet.

FREE!

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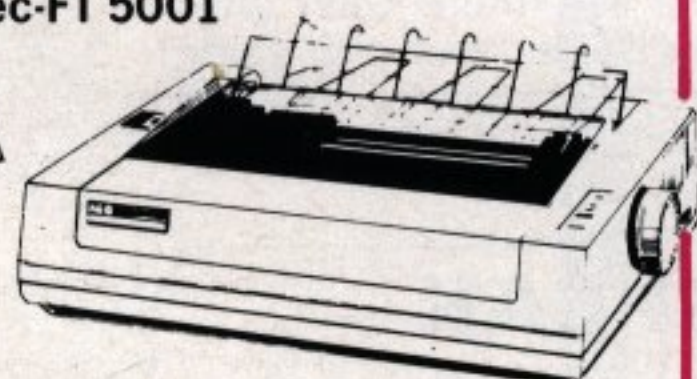
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|-------------------------------|-----|
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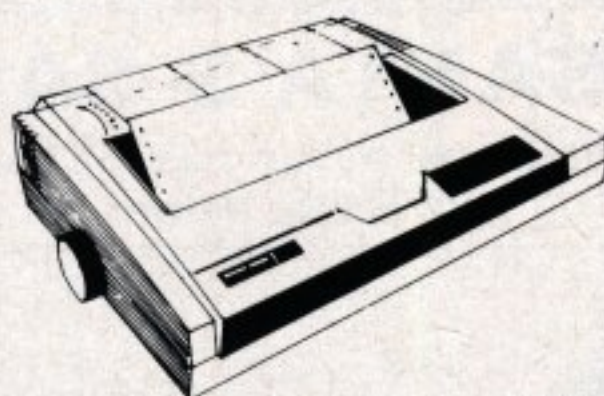
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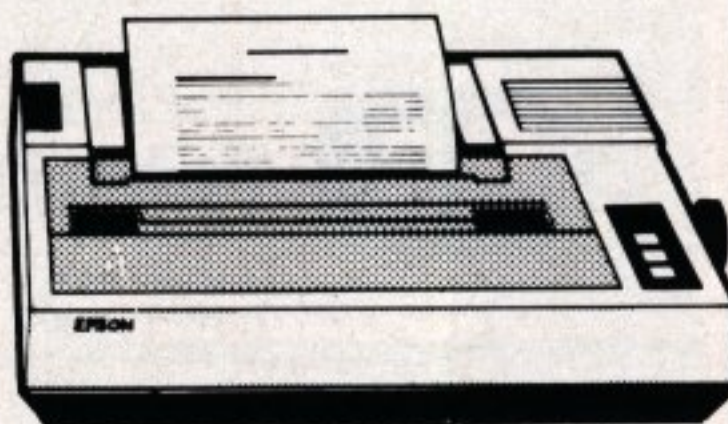
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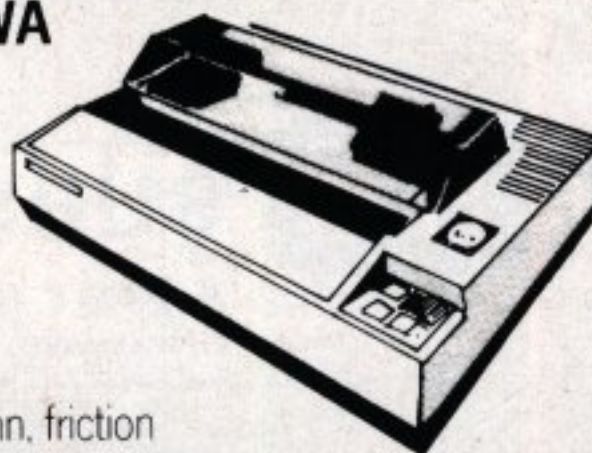
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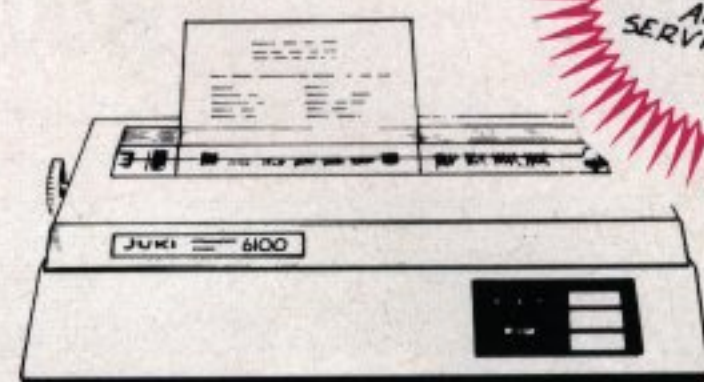
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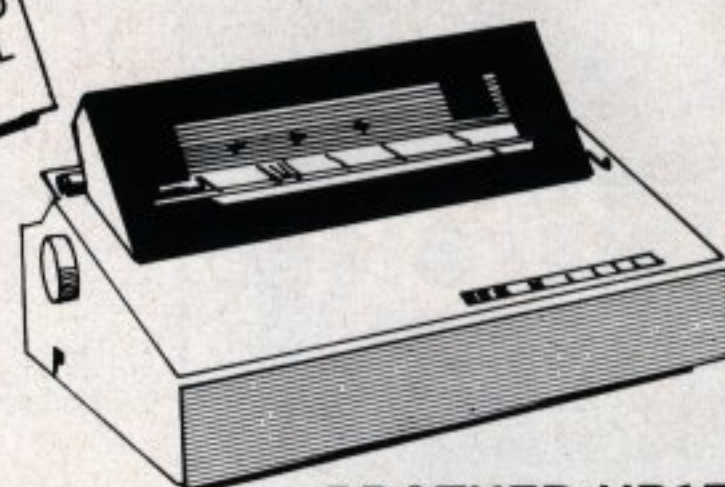
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|-------------------|------|
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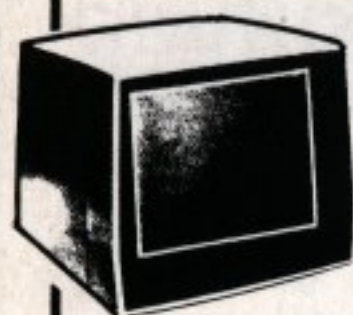
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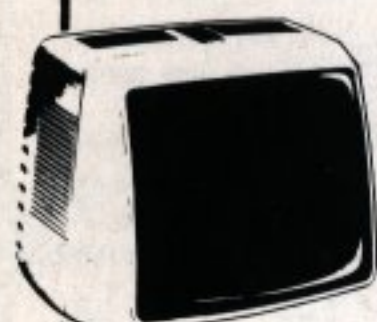
SANYO SM12H



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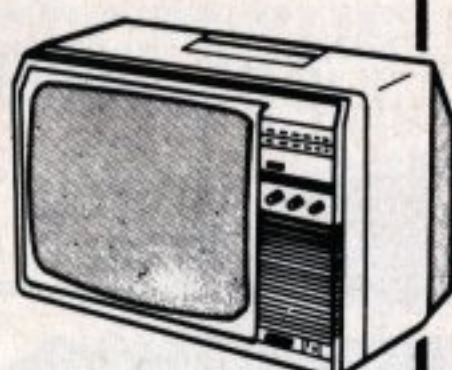
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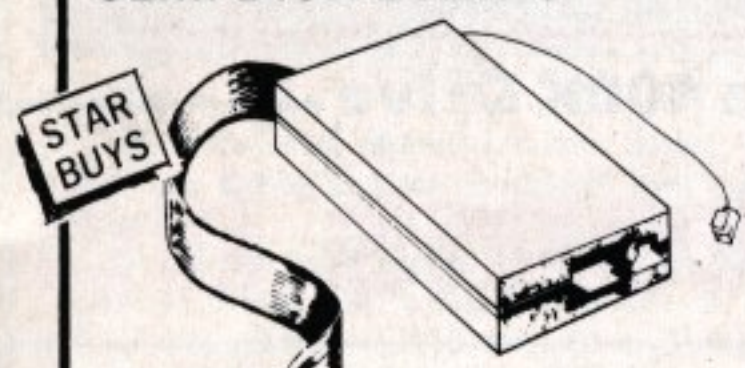
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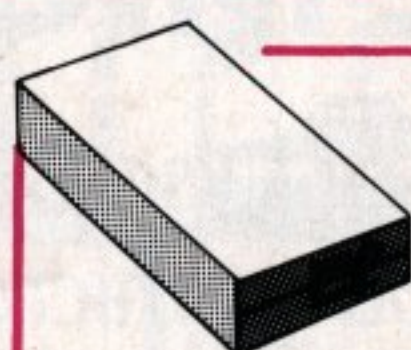
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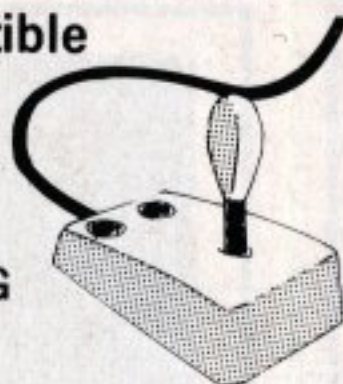
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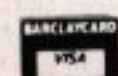
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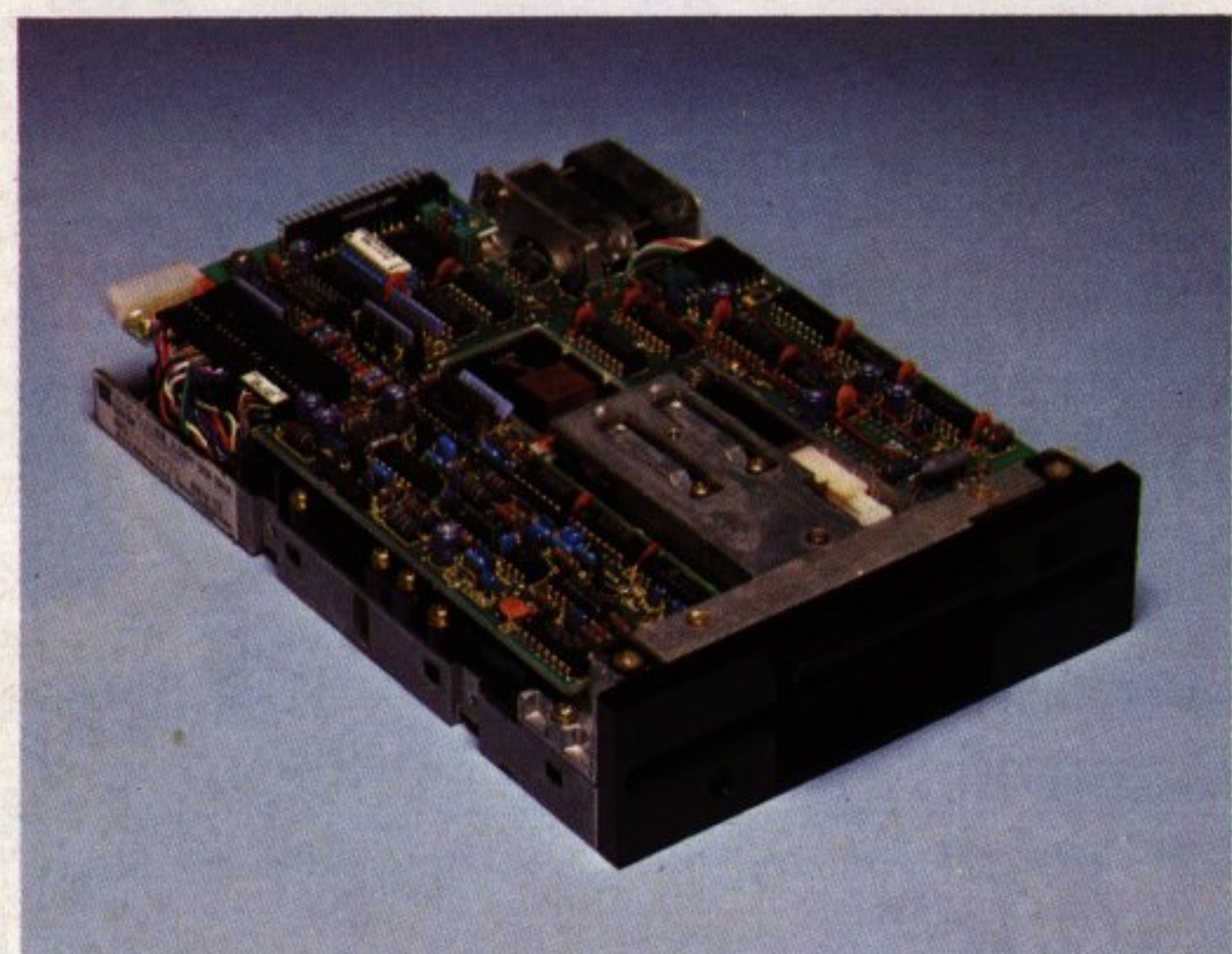
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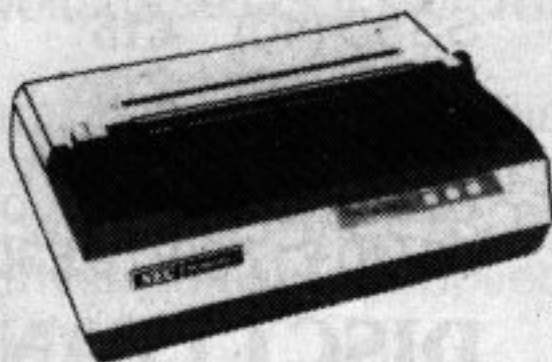
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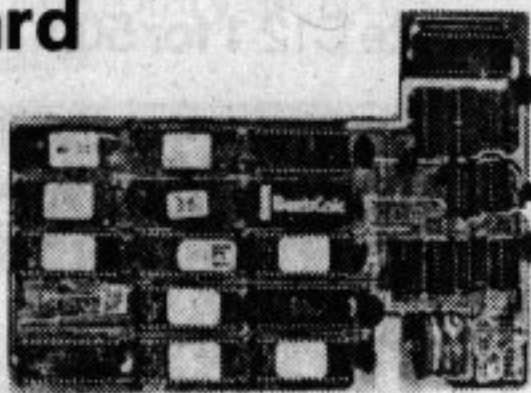
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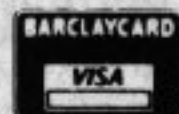
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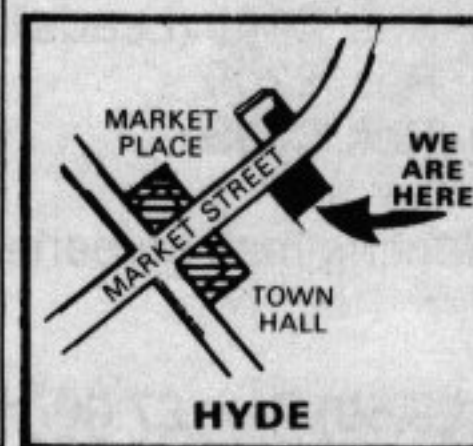
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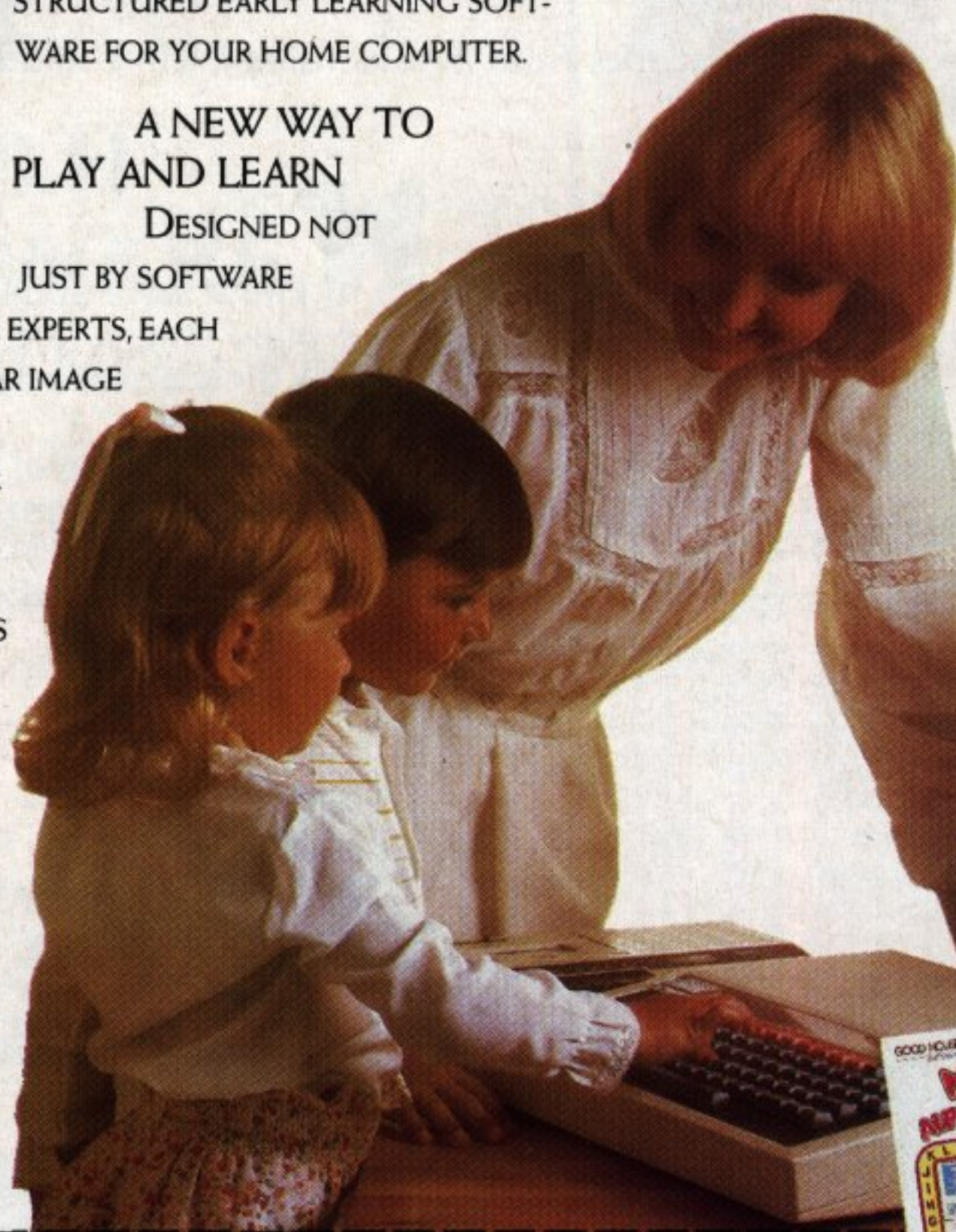
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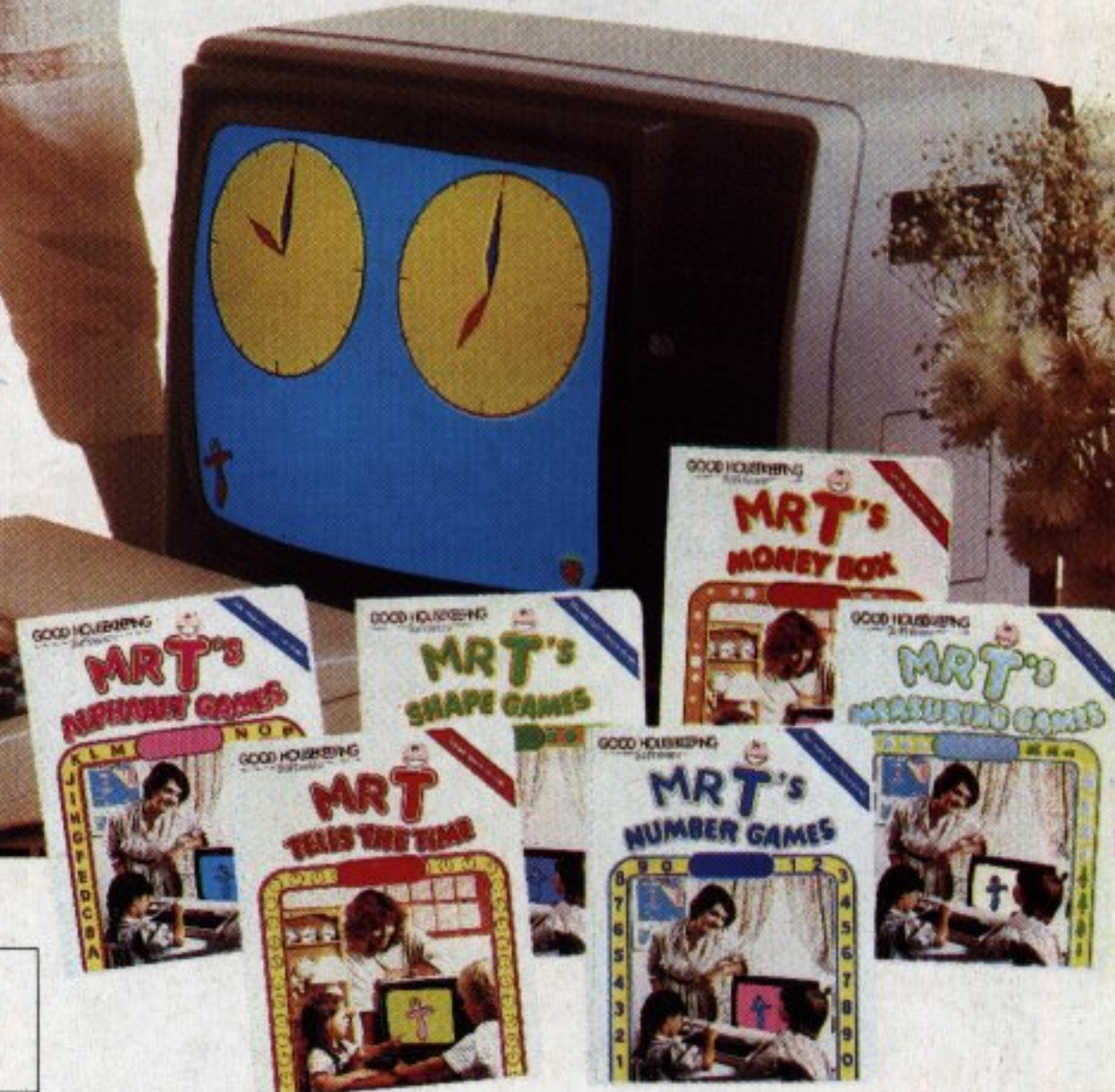
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Tel. 099 421 515. BBC Hobbit £135.00 + £3.00 p&p. BBC Second drive £120.00 + £3.00 p&p. Zero Memory Option £25.00 (£18.00 if ordered with the Hobbit). Power Supply £12.00. Manual (ordered separately) £1.50 (No VAT; refundable on purchase of Hobbit). Nascom Hobbit (unboxed) £120.00. Nascom second drive £94.00. Basic Upgrade Kit £10.00. Box of 6 cassettes £17.50. Cleaning cassette £3.50. Please add VAT at the current rate to the above prices. ACCESS AND VISA ACCEPTED.

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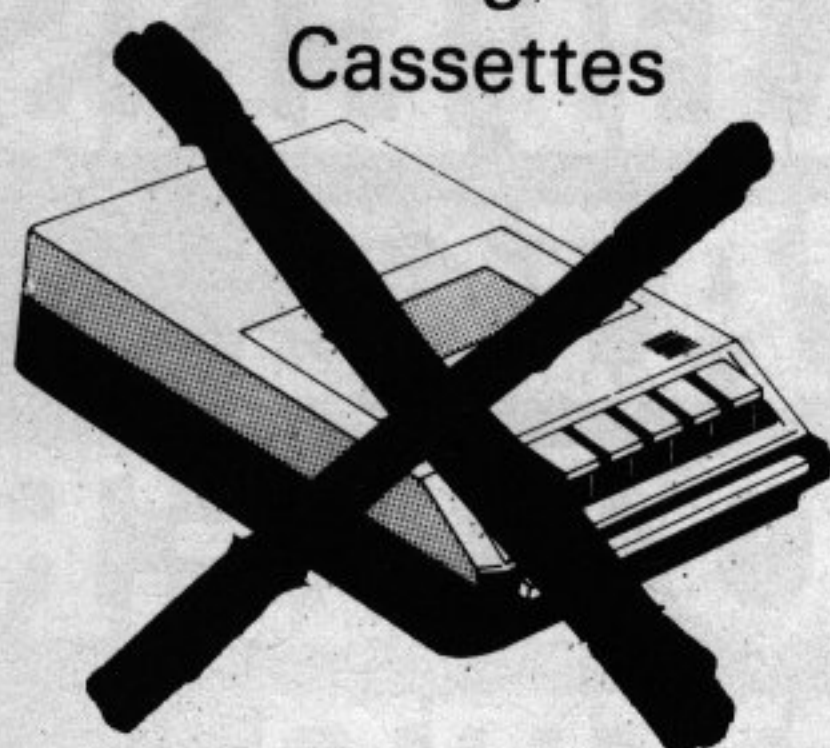
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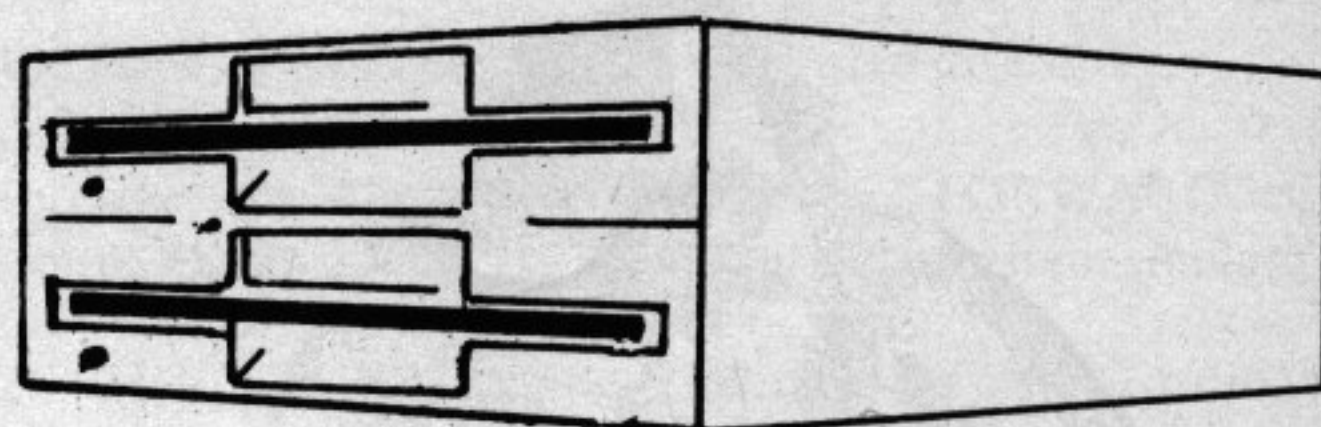
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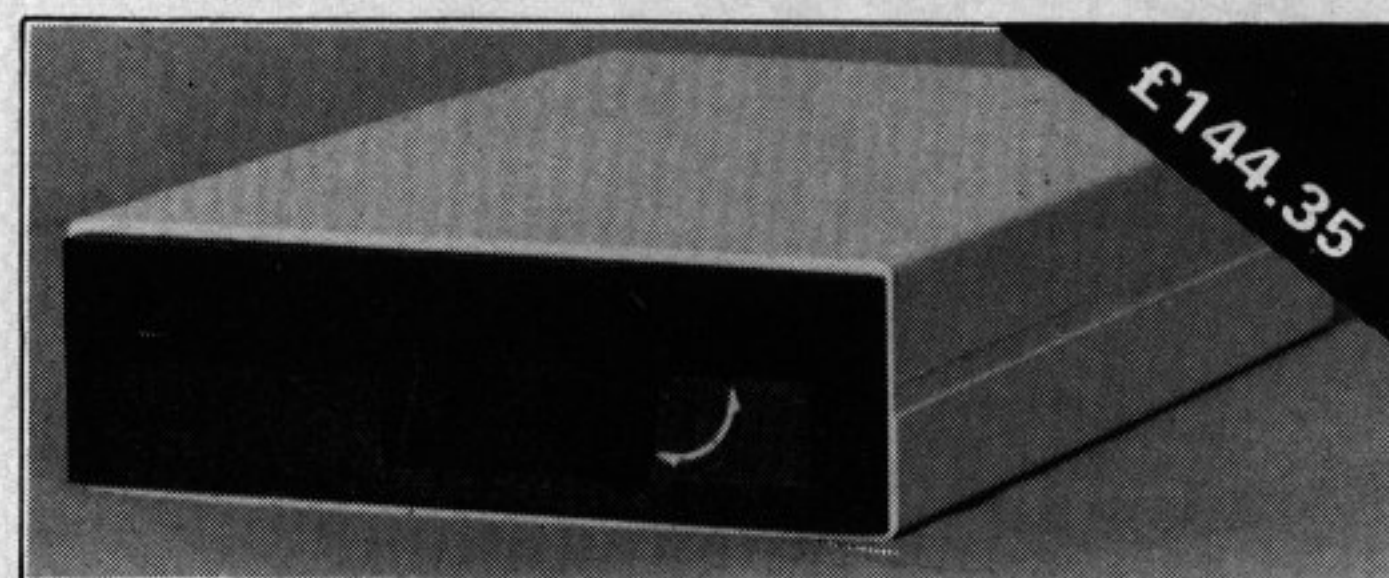
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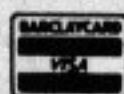


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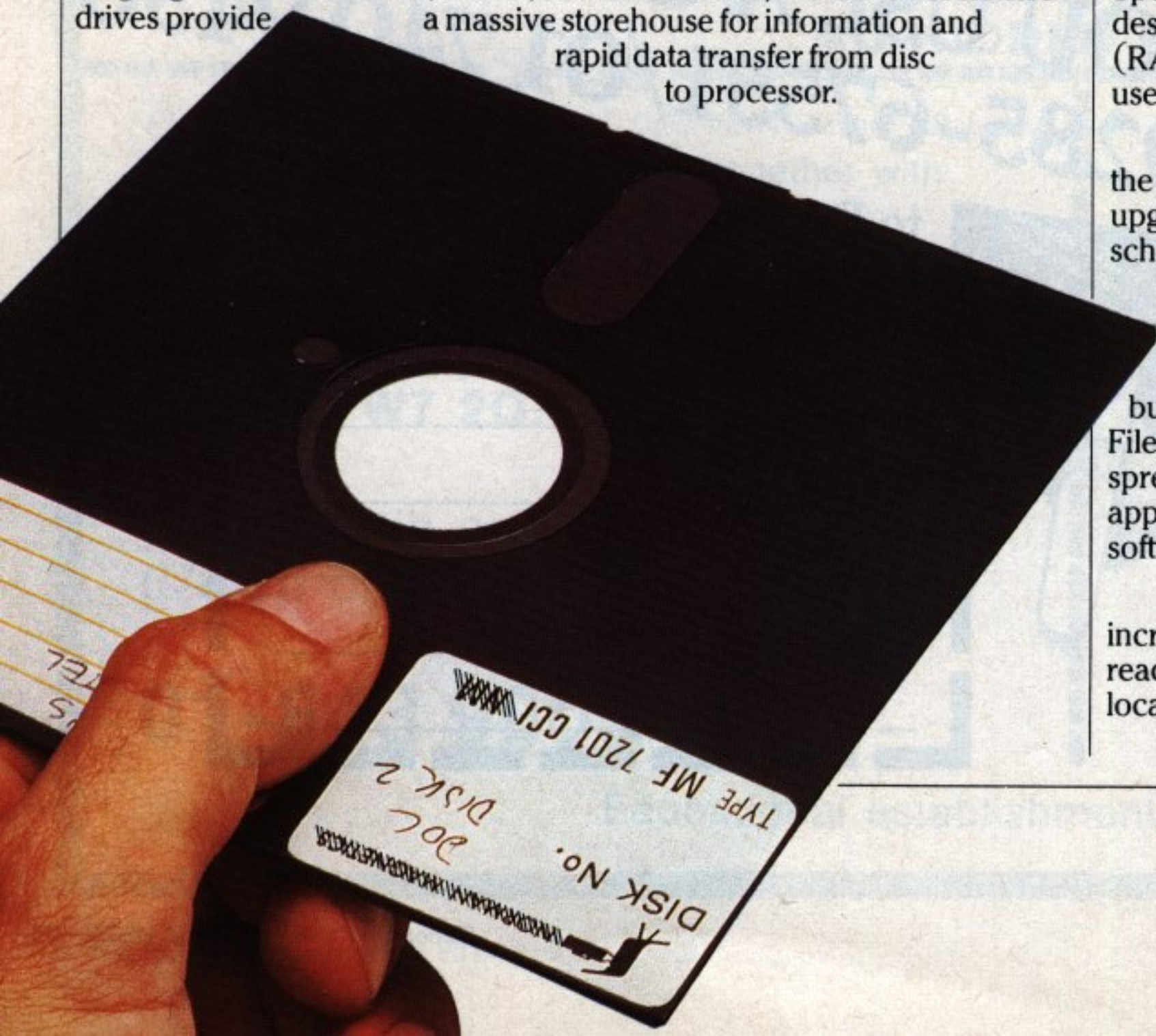
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The best thing next



The BBC Model B microcomputer is widely recognised as an impressive first computer for the home or the school, but its capabilities are restricted by its lack of data storage and the limitations of Basic for serious programming. For the user who needs more from this computer the Torch Z80 Disc Pack is a gateway to the world of advanced computing.

The Torch Z80 Disc Pack will upgrade your Model B micro to a full business machine, offering the use of more powerful and flexible languages such as Fortran, Pascal, BCPL and Cobol, while twin 400K disc drives provide a massive storehouse for information and rapid data transfer from disc to processor.



The Disc Pack includes a second processor – the proven and reliable Z80 which powers Torch's highly acclaimed C-series business computer. The Z80 co-operates with the Model B's own 6502 chip, delegating screen and peripheral handling to provide faster access speeds than any other comparable disc drive system.

In addition to accepting the BBC's extensive range of software, the Z80 Disc Pack supplies Torch's own CP/M®-compatible Network operating system, based in Read Only Memory (ROM). This advanced design means that almost all of the 64K of Random Access Memory (RAM) provided on the Z80 board is available for CP/M programming use – an advantage that no other BBC micro upgrade can offer.

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At only £730*, including installation at your dealer, the Torch Z80 Disc Pack offers real value for money. It is supplied with an impressive package of software including the PERFECT® range of business software comprising Perfect Writer (word processing) Perfect Filer (database management) and Perfect Calc (advanced, powerful spreadsheet). Add to that COMANEX®, the interactive management game, approved and used by leading Management Consultants – and you have a software package valued at over £1,000.

The Torch Z80 Disc Pack is a proven and cost-effective way of increasing the computing power of your BBC Model B micro, so if you are ready to take a step into the world of serious computing, contact your local dealer, listed on the facing page.

...to a BBC micro.

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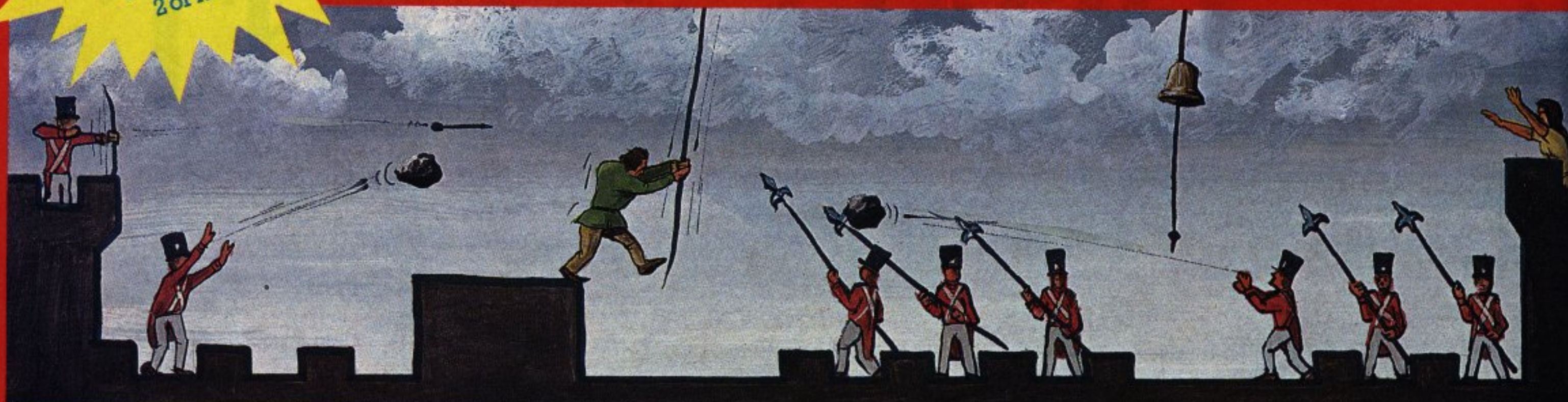
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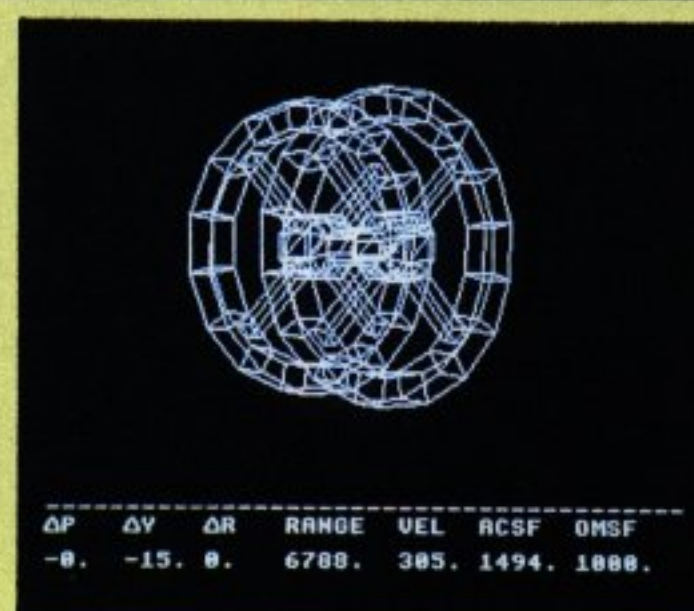
BBC



HUNCHBACK (32K) £7.95
An excellent version of the arcade game where Quasimodo attempts to rescue Esmeralda. Beautifully detailed animation (the best we've yet seen!) as Quasimodo leaps over the ramparts dodging rocks and arrows, swinging on ropes, avoiding the guards' spears, and ringing the bells. Twelve different screens of action! This program is sold under licence from Century Electronics Ltd; we have exclusive rights to its sale for use on the BBC micro.
(For use with KEYBOARD or JOYSTICKS).
●●● NEW RELEASE ●●●



CRAZY PAINTER (32K) £7.95
The only full-feature version available for the BBC micro. On the first screen, you take the part of a monkey being chased by African tribesmen. If you manage to survive by painting-in all the squares, the bonus screen features the monkey trying to reach his bunch of bananas. After that, you take control of a paint-roller and each square painted-in adds to your score. But beware... the teddy-bears are now in hot pursuit. Superb animation and sound-effects.
(For use with KEYBOARD OR JOYSTICKS).
●●● NEW RELEASE ●●●



2002 (32K) £7.95
A space docking simulator using a 3D graphics to model the motions and responses of the ORION 4 spacecraft. Your mission is to pilot the shuttle to a "soft dock" with the space station. PITCH, YAW, ROLL, FORWARD, LATERAL and VERTICAL engines are provided together with orbit manoeuvring booster engines. 6 skill levels provide for the completely inexperienced pilot as well as the fully-fledged commander.
●●● NEW RELEASE ●●●



ALIEN DROPOUT (32K) £7.95
A novel and unusual program. Arcade-action with this exciting multi-stage shooting game. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground.
(For use with KEYBOARD or JOYSTICKS).
"... these moths are out to get more than the clothes in your wardrobe."
... YOUR COMPUTER



FAIRGROUND (32K) £7.95
An exciting target-shooting game! Bonuses are scored for spelling out the word FAIRGROUND by hitting the appropriate target letters, and for shooting all the targets. Extra bullets are obtained by shooting the numerical targets, but watch out for the "smileys" who are intent on stealing your bullets. Music, sound effects, hi-score, and rankings.
●●● NEW RELEASE ●●●



CENTIPEDE (32K) £7.95
Incredible arcade-style game featuring mushrooms, snails, flies, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more lively and the number of mushrooms increases.
(For use with KEYBOARD or JOYSTICKS).
"Visually this game compares well with the arcade version, being colourful and clear."
... YOUR COMPUTER



ROAD RUNNER (32K) £7.95
The only full feature machine-code version available for the BBC micro. Features include: scrolling screen, radar display, 3 pursuing cars, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty, and sound effects.
(For use with KEYBOARD or JOYSTICKS).
"The game becomes very hard and has very smooth graphics. Excellent." ... BEEBUG MAGAZINE.



FROGGER (32K) £7.95
Not just another version of Frogger... this is the arcade-action version that you've been waiting to see. Graphically brilliant with gaping-mouthed crocodiles, diving turtles, flies, and frogs that flex their legs as they jump along. Increasing difficulty, and responsive controls.
(For use with KEYBOARD or JOYSTICKS).
"... very good indeed... fast flicker-free graphics and a frog that really hops!" ... BEEBUG MAGAZINE

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Micro link on show

PRACTICAL demonstrations of an inexpensive way to link up two BBC Micros will be one of the features of the BBC Micro User Show, to be held at the Westminster Exhibition Centre from December 8 to 11.

Experts on the *Micro User's* technical advice stand will be explaining the procedure, which was described in detail in the October issue.

The method outlined in the article has aroused a flood of interest and many users are now working on ways of incorporating it into games and other programs.

The show will include a number of specialist stands designed to give the BBC Micro user the most up-to-date information about his computer.

The government-backed Micro Electronics Project will be displaying all the latest in the world of educational computing.

The BBC themselves will be demonstrating their recently-launched telesoftware service, and our highly popular walk-in forums will include talks by some of the country's leading experts on the BBC Micro.

Scores of firms will be displaying their new products for the BBC Micro and Electron, many for the first time in public.

Latest to announce a

launch at the show is R.H. Electronics. They will be releasing a range of software and hardware products, including a video digitiser.



The BBC Micro controlling a small lathe

Software floods in for Christmas

Accent is on education

CHRISTMAS is coming, and so is a flood of new software for the BBC Micro.

Encouraged by the huge sales of BBC Micros to the schools, new software companies have been proliferating — mostly set up by publishing houses.

One of the most prestigious companies to enter the field is Cambridge University Press. They have joined ranks with Netherall School, the latest of our educational

institutions to succumb to the lure of the software market.

Not to be outdone, Longman, another of the establishment publishers, have joined with Loughborough Primary Micro Project to produce a range of educational titles aimed specifically at the home market.

Shiva Publishing has also chosen the Christmas season to launch a suite of four educational programs. Designed for five to eight-year-olds, the programs teach basic mathematical concepts.

Even the publishers of *Cosmopolitan*, the National Magazine Company, have entered the market. Their company,

Ebury Software, has launched a series of six titles aimed at the pre-school and infants market.

Reversing the trend somewhat, H & H, specialists in educational

software, has announced the launch of its first arcade game — *Looney Lift*.

Presumably, after all that worthy educational work, they were glad to let their hair down.

Now — a 3D game

WHAT is claimed to be the first truly three dimensional computer game has just been released by Postern.

“3-Deep Space” requires the use of special 3-D glasses which come with the package. When

wearing them the games graphics characters seem to pass in front of and behind each other, appearing to move in and out of the screen.

Postern claims that this opens up a new dimension in computer software.

Choice is Xenix

THE long awaited 32 bit second processor from Acorn will have Xenix as its operating system. Xenix is a version of Unix, an operating system that has gained wide acceptance in the world of mainframe and mini computers.

Logica UK will be adapting the system for Acorn.

Radio boost for new technology



NEW YEAR will see BBC School Radio entering the field of the new technology with two series of educational broadcasts aiming to introduce youngsters to the basics of electronics.

This has been done in cooperation with the Microelectronics Education Program (MEP) and the Department of Industry.

Software to accompany one of the series is currently under development by King Alfred's College, Winchester, and the MEP.

It is intended that at least a part of this software will be available over the BBC's

Telesoftware service in the New Year.

This can then be downloaded via the BBC Micro's Teletext Adapter, saved, and used in lessons.

Horizons

Speaking at a preview of the programmes, Claire Chovil, Head of School Broadcasting, Radio, said: "The age of technology opens up new horizons for our children. The education we give them must prepare them

for the opportunities which it will offer".

Despite this growing realisation that children have to experience the new technology in order to prepare them for the future, there is a shortage of suitably trained teachers.

Expand

To aid this situation both series are designed for teachers with little or no electronics knowledge. The more experienced will be able to expand on the programs, including them in their own lessons.

The first series, "Junior Electronics", is aimed at introducing the 9 to 12 year old age group to the elementary concepts of electronics.

The second, "Micro-technology", is designed for 14 to 16 year olds and should be relevant to the current O-level syllabuses. A basic knowledge of electricity is assumed.

Guiding

The emphasis is very much on learning by doing, the radio programmes guiding the children through practical experiments which can become the basis of a week's work.

The intention is that the programmes will be taped and used as needed in the classroom, each group of children learning at its own pace.

Both series have a special kit of components available for the children to use although the BBC are quick to point out that there is nothing to stop teachers making up their own packs.

For the microtechnology course there is also a breadboard and a bench power supply available.

There is a DoI subsidy on the first kit ordered for each school, showing the importance placed on this education for the electronic society of the nineties.

Junior Electronics
Five weekly broadcasts. Tuesday 2.20-2.40 Radio 4 VHF. First broadcast February 28, 1984.
Kit of parts and filmstrip available.

Microtechnology
Ten weekly broadcasts. Friday 10.45-11.05 Radio 4 VHF. First broadcast January 20, 1984.
Kit of parts, filmstrip, and breadboard available.

Slimline disc drive is on way

FOLLOWING the successful sales of BBC Micros in High Street shops, Cumana, one of the UK's leading floppy disc drive distributors, has decided to enter the same market with a slimline disc drive.

The 5 $\frac{1}{4}$ inch disc drive comes complete with user manual, 2-drive connecting cable and a formatting disc.

Available in single sided 40 and 80 track, and double-sided 80 track formats, each drive comes

with mains power supply lead and plug.

This will be the first time that a computer peripheral has been sold in this way.

The emphasis is on providing both retailer and consumer with an attractive, easy-to-understand package. So the next time you buy *The Micro User* you might be able to get a disc drive off the same shelf.

More titles adapted for BBC

THE ever-increasing sales of BBC Micros have caused major suppliers of software for other machines to adapt their programs for the BBC Micro.

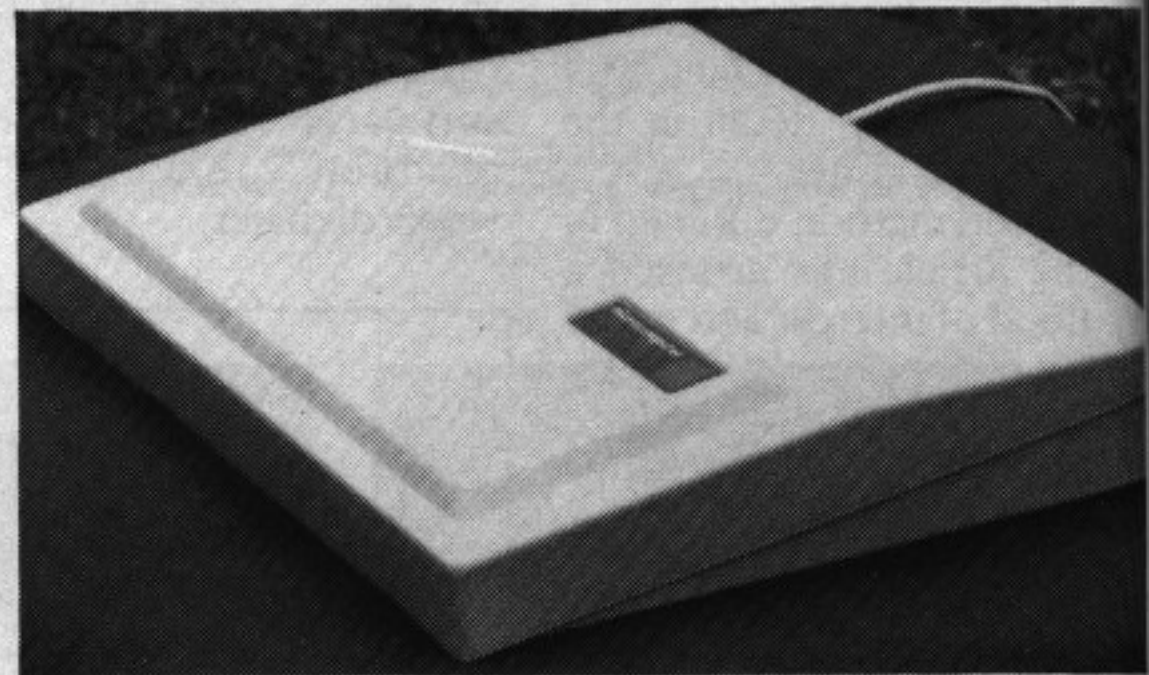
Microdeal, one of the foremost software producers for the Dragon has converted its best-selling Shuttle program for the BBC Model B. Also released at the same time is their Air Traffic Controller.

Four titles for the BBC Micro aimed at the Christmas market have been launched by leading Spectrum software house, DK Tronics. Their Slicker

Puzzle, considered to be as compulsive and infuriating as the Rubik Cube, is tipped to be a best seller.

Also translated from the Spectrum is *The Hobbit*, Melbourne House's adventure based on Tolkien's novel, a copy of which is included with the game.

Extremely successful in its Spectrum version, the BBC Model B reincarnation has been eagerly awaited.



Taking the brunt

A HARD cover to protect your BBC Micro from the degradations of children, spouses and twentieth century life in general has just been released by Tekform Products.

Made in high impact ABS, the cover's cream textured finish matches that of the BBC Micro. With anti-slip foam pads on the underside to further protect the micro, the cover is expected to sell well to educational and domestic users.

Micro plays lead

A BBC Micro is the star of a science fiction play being performed by pupils of Moorside High School, Manchester.

The play, "The Adventures of Harry Willets, Cargo Pilot" is set on a spaceship in the near future. This has its own computer, Doris, played by one of the pupils sitting in a metal tank with only her head protruding. Doris is considered one of the crew and can answer any questions put to her.

The BBC Micro works closely with Doris. It is

linked to a specially hired 45 inch TV and provides text and graphics displays to coincide with Doris' speech.

The idea of using the micro came from the play's producer, English teacher Alan Liptrot. He enlisted the aid of fifth year pupil David Pearson whom he describes as a "computer whizz-kid" to write the software.

"It started off as a small part of the production but now the BBC Micro has become the star", he said.



Teachers launch software house

THREE North West teachers have turned their backs on classrooms to have more impact on the educational front.

They have pulled out of their schools in order to help launch a new software house – Optima – based in Stockport, Cheshire, which they are convinced will enable them to communicate far more effectively with schoolchildren than traditional teaching methods.

All three teachers – Peter Davidson, 32, Chris Price, 33 and Trevor Roberts 33 – are graduates and between them have teaching experience which ranges from primary schools through to sixth form colleges.

“We have not abandoned the kids but are simply adopting a new approach”, said Peter Davidson, Optima’s software development manager.

“What we are doing now will be far more meaningful than what we were able to achieve in the limitations of the class-

room system”.

Optima Software’s first wave of products include two programs tailor-made for schools across the country.

Datext, an easy to use teletext editing and library program, provides multi coloured worksheets suitable for anything from sixth form science experiments to nursery rhyme books for infants.

Monitor

The newly-formed software company is also offering Optimon, a full machine code monitor which can be utilised as a learning tool for more advanced students.

It eliminates time consuming and unnecessary tasks and instructs the

youthful programmer on machine capabilities.

Although the main thrust of Optima’s activities will be on the educational front, games will also figure prominently on its product list.

It has already received welcoming reviews for Asteroid Miner, Sea Wolf and Atomic Protector which it recently unveiled for the Christmas market. Other titles are scheduled to appear shortly.

“We aim to be a complete software house”, says Peter Davidson. “But we obviously feel that we have that little something extra to offer in the educational field because of our teaching backgrounds”.

BRT picks BBC

BRT, the Belgian Dutch-language television service, is halfway to completing an educational series scheduled to begin in January.

There will be 12 half hour programmes, using the BBC computer, and these will be linked to a study course of textbooks and cassettes.

Acorn sponsors world chess championship semi-finals

ACORN has pulled off Britain’s largest chess sponsorship deal by sponsoring the semi-finals of the world chess championships to the tune of £100,000.

The deal, which allows the British Chess Federation to stage the matches in London, was made in the face of rival bids from Holland and Austria.

“It’s all come as a bit of a rush”, said a spokesman for the BCF.

“As yet we haven’t arranged a venue for the games though they should start at the end of November and last for a month”.

Acorn’s sponsorship of the two matches is a coup for Britain after earlier arrangements had fallen through.

The game between the Russian Gary Kasparov and Russian defector

Victor Korchnoi was to have been held in California until Kasparov, complaining of security problems, refused to travel there.

Similarly, the game between the veteran Russian Smyslov and Ribli, the Hungarian, which was to have been held in Abu Dhabi, was cancelled because of the heat.

The offer from Acorn solves all these problems, allowing the series to go ahead.

RECOMMENDED..

The two teach-yourself computing books recommended by the BBC in the weekly TV series “The Computer Programme” can now be obtained from *The Micro User*.

They are “The Computer Book”, by Robin Bradbeer and “The Friendly Computer Book”, by Jonathan Inglis.

They can be ordered using the coupon on Page 122.

Keeping tabs on Ferraris

A BBC Micro along with a Z80 second processor (on field trials) is being used to keep records of buyers and sellers for a Ferrari brokerage.

The firm, Compute-a-Ferrari, was founded in January by David Hunt, younger brother of the former world champion driver.

Software for the system was made by Acorn who also sponsor David Hunt in Formula 3 motor racing.

Detailed descriptions of Ferraris for sale are

entered into the micro, covering 28 categories from the condition of the tyres and bodywork to interior marks – even cigarette burns.

Prospective buyers give details of the car they are looking for and the micro does the match-making.

The system has been so successful that there are plans to extend it to cover Porsche, Lotus and Aston Martin too.

The BBC Micro stars in Belgium

THE popularity of the BBC computer is not limited to the United Kingdom.

The BBC users group in Brussels is already 135 members strong and growing daily.

The club meets once a fortnight, is extremely active, and has its own monthly newsletter.

The distributor for Belgium and Luxembourg, Société Luxembourgeoise d'Informatique, is providing strong support for the club.

Expertise

A BBC Micro complete with discs and colour monitor has been placed on permanent loan with the group. A high level of expertise is available to beginners in both hardware and software.

One member is responsible for a 40/80 track disc switch which can be easily added to the BBC Micro and is featured in the new catalogue of Control Universal of Cambridge.

Micros in the cottages..

BRITAIN will return to a society based on cottage industries, says Richard Fothergill, Director of the Microelectronics Education Programme.

This, he says, will be as a result of the new technology.

He cited BBC School Radio's microelectronic education series, which he

called "one of the more imaginative and innovative activities the MEP has been associated with", as an example of this tendency.

The series and their supporting hardware had been the result of co-operation between people and agencies spread across the country.

Two Newcastle housewives had designed the screen layout, while the MEP had provided the software.

Components

A "garden shed"-based supplier in Liverpool was providing kits of components, with another small manufacturer in

Essex developing a power supply unit for the project.

This cooperation between small groups at a distance was, he felt, the blueprint of our future society. It would also become a major source of jobs for the young people who will make up that society.

More hardware from Acorn

TWO new pieces of hardware have been unveiled by Acorn.

The first is the Acorn Bit Stik graphics system, a development of the well-known Apple Bit Stik. This is an extremely sophisticated computer aided design package consisting of the Bit Stik itself (a type of super joystick) together with dedicated software.

The system allows the user to define, with the minimum of keyboard input, a whole library of designs which may be then combined in a variety of methods.

Particularly interesting is the zoom feature, which allows you to magnify a fraction of the screen. You can add

details to that part of the design in high definition, then return to the standard magnification.

The system also permits images to be stored in a library and recalled at will. Said to be faster and to use less memory than the Apple version, the Acorn Bit Stik is one of the results of the company's new policy of buying-in products for the BBC Micro.

The second development promised is an IEEE interface for the BBC Micro.

This makes the machine the first com-

puter of its type to have available all of the standard I/O ports — RS423, Centronics and IEEE.

Aimed mainly at the laboratory market in schools and industry, Acorn claim that this is the first full specification IEEE interface available for a micro.

Also supplied with it will be an IEEE language system which can be used to control the attached equipment. Said to be simple to use, the IEEE language can be accessed from Basic and used by most schoolchildren.

Light on data capture

A LIGHT pen claimed to be far easier to operate than others on the market has been launched by Datapen Microtechnology.

Said sales director Pam Rayner: "Most light pens on the market are difficult to use because the operator has little or no control over the pen's data capture as it approaches the screen."

"Our model has a LED readout showing that data is available. A switch built into the casing allows the operator to signal when the position is right".

The light pen, which comes with a range of software, retails at £25.

BARRY WOOD'S TAILPIECE

THE other day I caught our beloved editor reading a copy of a rival magazine — you know, the one for squirrels.

He grinned at me sheepishly and said: "I can't resist the delicious feeling of déjà-vu it gives me".

★ ★ ★

I HAD a terrifying conversation with a software house this week. Their bright young chap said: "Our program's been tested on the 2.1 OS".

"Don't you mean 1.2", I glibly corrected him.

"Oh no", he replied, "our boss has got a

friend at Acorn, and the one he got from him is higher than that".

★ ★ ★

WELL Mr Pike, we know your name, and we know you're a deputy headmaster.

What we don't know is your school, but we're quite confident that your pupils, who've been scrawling electronic graffiti over Prestel while you've popped out of the room, will inform us soon enough.

★ ★ ★

LAMEST excuse of the year award must go to our associate editor who

was stopped by our gallant constabulary for speeding.

"Oh", said he, "I thought the 30 was in hexadecimal".

They let him off. Pity.

★ ★ ★

IT'S lovely to see that the teletext adapter is such a nice creamy beige. It will go so well with my collection of second processors and Electrons.

★ ★ ★

ACTUALLY we're all a bit miffed here because Acorn have poached our gorgeous marketing manager.

Come to think of it,

I've heard that Acorn are after me...

★ ★ ★

"WHO told Barry Wood about our new DFS?" demanded a gentleman from Acorn of our less-than-gentlemanly editor.

"What new DFS is this?" enquired my unworthy superior. Exit Acorn man stage left.

So here's my project for this month. You've got to find the first Acorn spokesman to deny they're working on a new DFS.

★ ★ ★

THOSE electronic vandals probably got the

idea from the hackers on Making the Most of the Micro Live.

I certainly can't see anyone getting anything else from it.

★ ★ ★

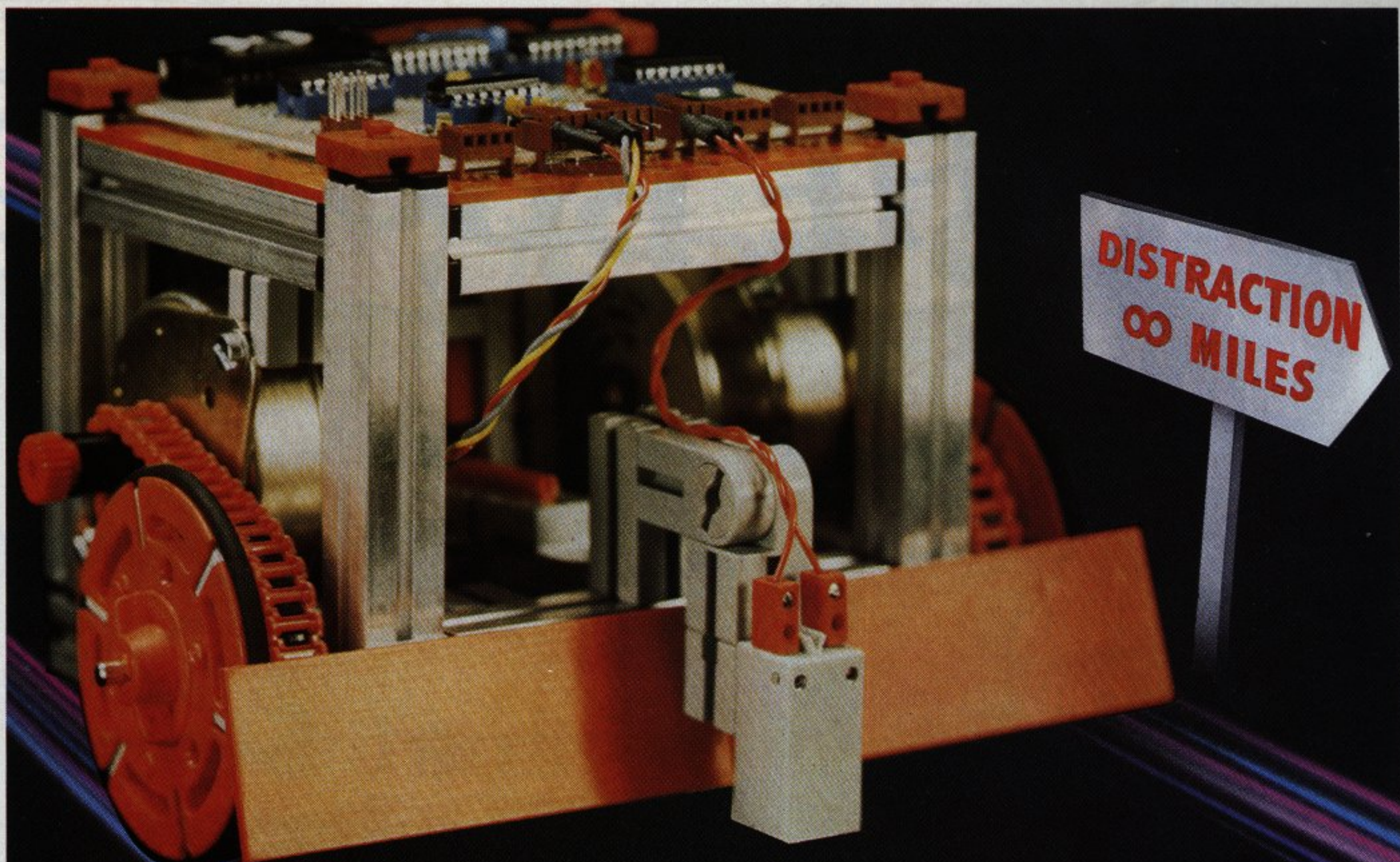
SO, we're going to have Xenix for the 16032. I just can't wait to get it up and running on mine.

Question is, is it Xenix 0.1 or Xenix 1.2?

★ ★ ★

SO Acorn are "computer modelling" race tracks so their car can go faster, are they?

Isn't it a pity that they haven't applied the same techniques to the Electron production lines?



DRIVE YOURSELF TO DISTRACTION

WITH A **BBC** BUGGY

Trying to determine the limitations of the BBC Buggy is a task which will drive you to distraction. So sit back and accept the fact that your BBC Micro computer (Model B) controlled Robot will provide you with hours and hours of stimulating entertainment.

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The Buggy's software which is based on the 'building block' principle consists of 12 robust application programs and one familiarisation program all of which feature full graphics.

Take a trip into the future without ever leaving your key-board – drive a BBC Buggy.

PROGRAMS

Test and familiarisation.

Switch – direct computer control.

Memory Switch – demonstrating computer memory.

Routeplanner – advanced version of Snail.

Recorder – route display.

Snail – screen route planning.

Explore for wall – mapping of boundaries.

Explore for object – seeks objects, defines shapes, returns home.

Bar Code Routeplanner – non-keyboard information input.

Tin Pan Alley – composing music by bar codes.

Man vs Buggy – 'Flying blind'.

Sunseeker – seeking a light and negotiating obstructions.

Line Follower – black or white line following.

The BBC Buggy is available from Acorn/BBC dealers and other major outlets.



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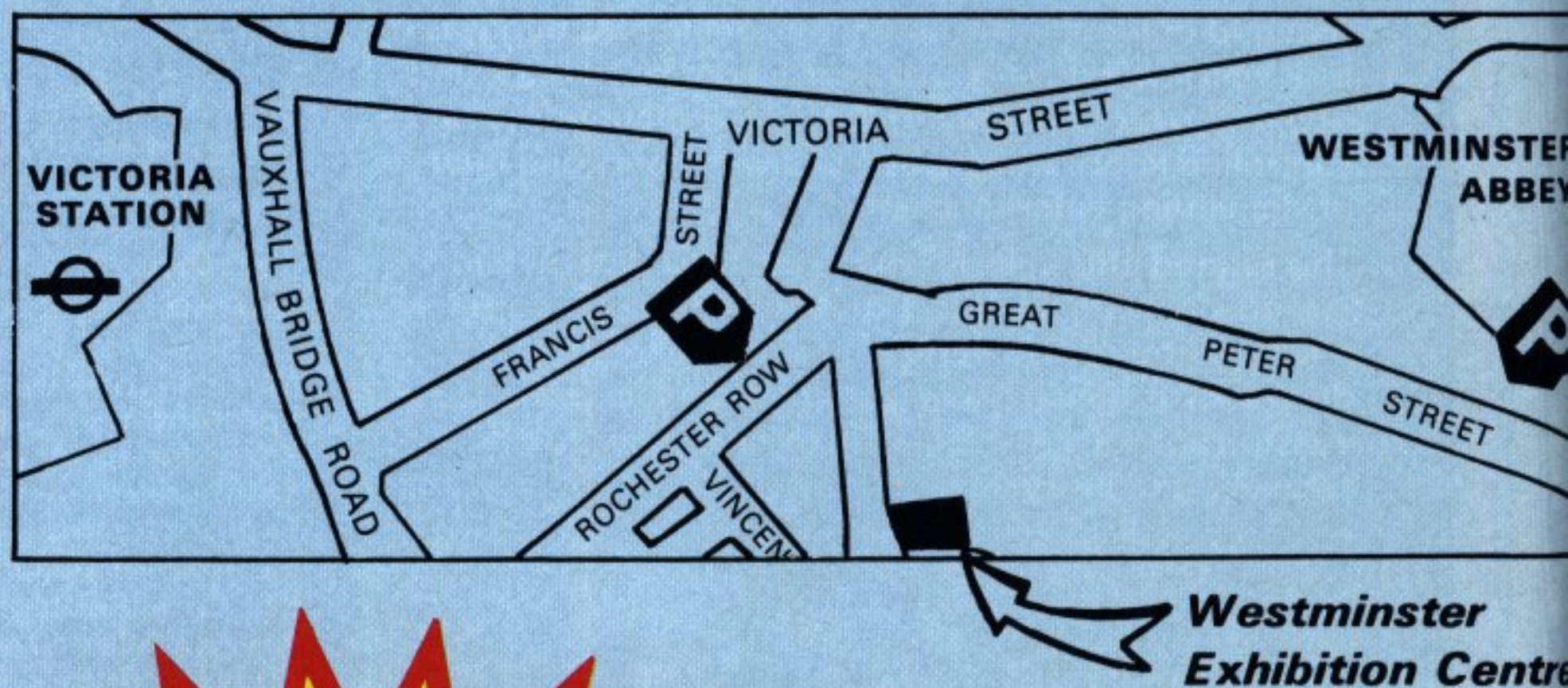
THE BBC MICRO

Westminster

(formerly)

Greycoat Street, London SW1

The show that attracted record attendances in Manchester and Nottingham now comes to the heart of London - with a fabulous pre-Christmas bonanza of all that's best for the BBC Micro.



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Exhibition Centre

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Thursday to Sunday, December 8 to 11

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- ★ **TRY OUT** for yourself the games that will be the top sellers this Christmas – and well into next year.
- ★ **FIND** out about all the new peripherals for the BBC Micro – disc drives, interfaces, ROM boards, robots and second processors.
- ★ **DISCOVER** why the Electron – the baby brother of the BBC Micro – has been hitting the headlines and why all the experts are tipping it to be the big seller of 1984.

£1

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(adults) and £2 (children)

The BBC Micro User Show

10am - 6pm, Thursday, December 8
10am - 6pm, Friday, December 9
10am - 6pm, Saturday, December 10
10am - 4pm, Sunday, December 11

Westminster Exhibition Centre,
Greycoat Street, London SW1.

GROUP BOOKINGS

Schools can obtain additional tickets by sending a stamped addressed envelope to: BBC Micro User Show, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

£1

off normal exhibition
admission price of £3
(adults) and £2 (children)

The BBC Micro User Show

10am - 6pm, Thursday, December 8
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Drives of the future



Now available for the BBC Microcomputer, this superb range of high performance, low profile disc drives which give more data storage, and use less space.

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| PDD4 | Double Sided 80 Track Only (800k) | £538 | £618.70 |
| PDD5 | Single Sided 40/80 Track (400k) | £449 | £516.35 |

Available from good computer stores everywhere including:

Computer City, Widnes, Cheshire. Tel: 051-420-3333. Computerama, Stafford. Tel: 0785-41899. Silcon Centre, Edinburgh. Tel: 031-557-4546.

Computerama, Stoke on Trent. Tel: 0782-268620. G.T.M., Leeds. Tel: 0532-647474. Wilding Computer Centre, Wigan. Tel: 0942-44382

National Micro Centre, Stockport. Tel: 061-483-3605. Sir Computers, Cardiff. Tel: 0222-21341. P.J. Microsystems, Crowthorne. Tel: 0344-772351.

SOME people find even Basic programs too fast, especially people learning to play a new game or possibly disabled folk. So here is a simple program to slow them down a little.

It will work with any Basic program provided that the variable U% is not used – this can be easily changed, see later – and it will work with some machine code programs (if zero page locations &70 to &90 are not used, and the interrupt is not disabled).

Load it before your usual program. Full instructions are on the screen.

All it does is put two nested loops (with nothing inside them) into the interrupt routine, so that the computer does a few loops every 100th of a second to slow it down.

In the program the registers are pushed onto the stack, X is decremented down from 40 (this can be changed in line 120), and Y is decremented from the value in U% (values from 2 to 5 work best).

The registers are then pulled back from the stack.

If U% is used in your program, change U% in lines 10 and 50 to some other single letter integer variable, and, in line 120, change &454 – the location where U% is stored – by 4 for each letter difference.

For example, to change to T% change the location to &450 ; V%=&458 ; W%=&45C ; and so on.

Avoid A%, P%, X%, Y%. If you want to avoid variables altogether, but make the speed more difficult to change, alter line 120 to, for example, 120 LDX#40:LDY#3.

Have fun experimenting! You can see how much the machine has slowed down by typing the following (or put it in a function key):

```
TIME=0:FORI=1 TO 1000: NEXT:
PRINT TIME
```

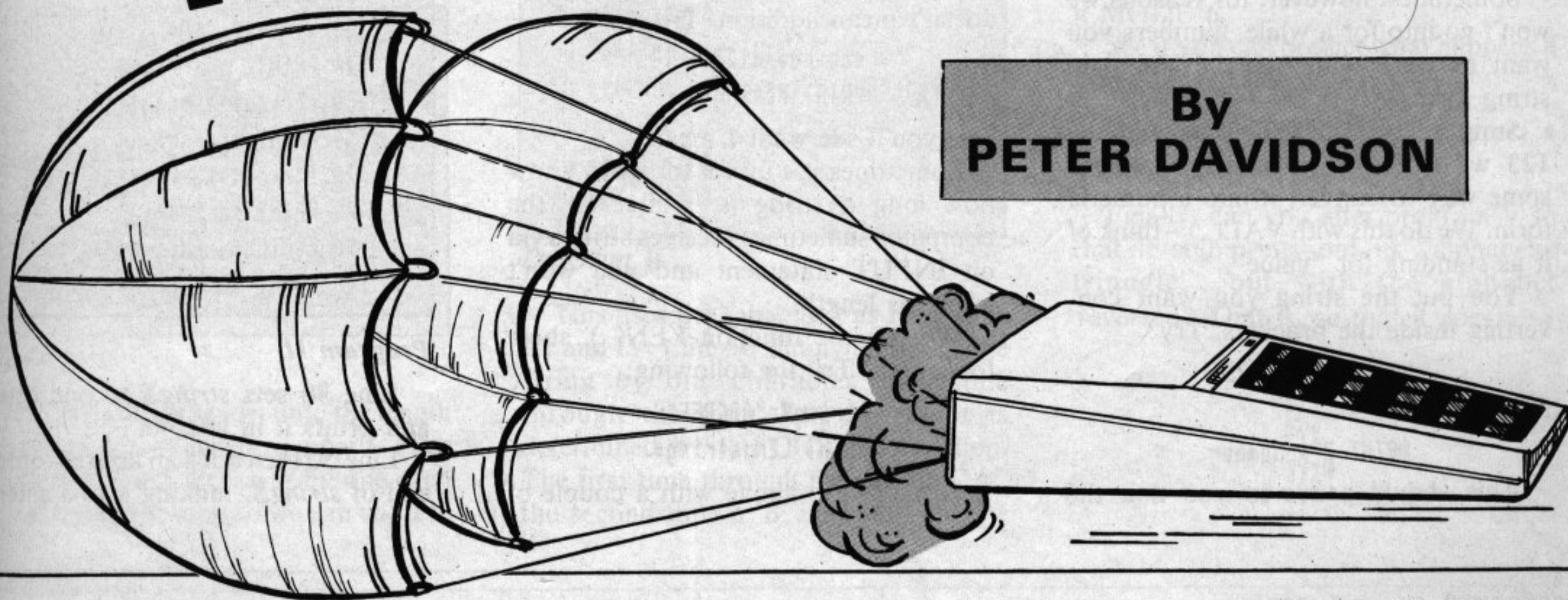
Note that as U% rises above 6 letters are missed if you do not depress them long enough as you type.

A value of U%=4 causes this simple test to take approximately twice as long as usual.

```
10 *KEY9U%=3
   :?&204=&70
   :?&205=01M
20 CLS
   :PRINT "SPEED REDUCER"
30 PRINT "AFTER LOADING THIS PROGRA
   N PRESS BREAK AND LOAD YOUR
   NORMAL PROGRAM IN THE USUAL
   WAY"
40 PRINT "BEFOPE RUNNING YOUR PROGR
   AM PRESS THE RED FUNCTION KEY
   9 (TO SET THE SLOW DOWNPROGRAM
   INTO ACTION); THEN RUN YOUR
   PROGRAM IN THE USUAL WAY"
50 PRINT "CHANGE SPEED AT ANY TIME
   (WHILE PROGRAM IS NOT RUNNING)
   BY TYPING" "UX=(a number from
   1 to 5)" "AND RUNNING YOUR PROGR
   AM AGAIN"
60 PRINT "PROGRAM ASSEMBLED
   AT ";
70 PZ=&70
80 [
90 OPT0
100 SEI
110 PHA
   :TXA
   :PHA
   :TYA
   :PHA
   :CLC
120 LDX#40
   :LDY&454
130 .START DEX
140 BNE START
150 DEY
160 BNE START
170 PLA
   :TAY
   :PLA
   :TAX
   :PLA
180 JMP &DC93
190 ]
```

HOW TO GIVE YOUR BEEB A DRAG FACTOR

By
PETER DAVIDSON



Doing things w

LET'S start off this month by reviewing the difference between string and numeric variables.

String variables label "strings" of characters, such as "HELLO" and "GOODBYE".

Numeric variables label numbers in a way that lets us do sums with them.

We can use whole words for both types of labels.

You tell the computer it's dealing with a string variable by ending the label with a \$ symbol.

This means that *word\$* would label a string, while *number* labels a number.

We also met another type of numeric variable, the integer variable. In this case the label is followed by a % sign. Integer variables deal with whole, or integer numbers – they haven't learnt to do decimals!

Now the computer can remember a number in the form of a string variable, in the same way as it can remember any string of characters.

This means that:

```
number$="123"
```

makes sense. Enter it now. (Remember that when we assign a string variable, the string of characters must be in quotes.)

If you now try:

```
PRINT number$
```

you will indeed get 123 appearing on the screen.

So you can, if you wish, label numbers as strings.

You cannot, though, do sums with the strings. Try:

```
PRINT 2 * number$
```

and see what happens!

The moral is, if you want to do sums stick to numeric variables.

Sometimes, however, for reasons we won't go into for a while, numbers you want to work with may be stored in string form.

Suppose we want to do sums with the 123 we stored in *number\$*. We need some way to convert it into a numeric form. We do this with VAL() – think of it as standing for "value".

You put the string you want converting inside the brackets. Try:

```
number=VAL("123")
```

followed by:

```
PRINT 2 * number
```

This should prove to you that the

string really has been converted into a number! Notice that there are two variables here, *number* and *number\$*. The former is numeric, the latter string.

Of course, you can put the string variable inside the brackets rather than the full string. So you can use *number\$* rather than "123". Enter:

```
number=VAL(number$)
```

then:

```
PRINT 2 * number
```

and you'll see that it works just as well.

There's also a way to convert numeric variables into strings. Again you might be wondering why anyone would bother, but for the moment, just take it on trust that one day you'll want to! We use the function STR\$(), which you can consider as standing for 'strings'. Enter:

```
number=123
```

followed by:

```
number$=STR$(number)  
PRINT number$
```

and you'll see how it works.

Now when I said that you can't do sums with strings I was being completely truthful. However there is something you can do with strings that looks suspiciously like you're doing sums.

Enter:

```
string$="*"+"@"  
PRINT string$
```

What happens is that the '+' sign 'glues' the two strings together. The jargon calls this "concatenating strings". The add sign in this case doesn't mean addition. Try:

```
string$="123"+"123"  
PRINT string$
```

and you'll see what I mean.

Sometimes it's useful for us to know how long a string is – after all, the computer sometimes receives strings via an INPUT statement and you won't know its length.

We use the function LEN(), short for length. Try the following:

```
string$="ABCDEF"  
PRINT LEN(string$)
```

Also try the above with a couple of

spaces between the first quotes and the A – spaces count!

Have a look at Program I.

```
10 REM *** PROGRAM I ***  
20 MODE 6  
30 first$="ABC"+" "+"DEF"  
40 second$="ABC"+" "+"DEF"  
50 PRINT "first$ is "first$  
60 PRINT "Its length is ";  
   LEN(first$)  
70 PRINT "second$ is "second$  
80 PRINT "Its length is ";  
   LEN(second$)
```

Program I

Look carefully at lines 30 and 40. The strings *first\$* and *second\$* are not identical. In line 30 the second pair of quotes encloses a space. In line 40, the second pair of quotes enclose absolutely nothing – not even a space.

We say that they enclose the "null string" – that is, absolutely nothing.

This results in there being a space between the ABC and DEF in *first\$* but there being absolutely nothing between the two sets of characters in *second\$*.

It also explains the different lengths.

Have a look at Program II. Notice by the way, that lines 50 to 100 contain a lot of repetitions – judicious use of the copy key will save you a lot of typing!

```
10 REM *** PROGRAM II ***  
20 MODE 6  
30 string$="*"  
40 PRINT "string$"  
50 string$=string$+"*"  
60 PRINT string$  
70 string$=string$+"*"  
80 PRINT string$  
90 string$=string$+"*"  
100 PRINT string$
```

Program II

Line 30 sets *string\$* to one asterisk and prints it in line 40.

Line 50 then adds an asterisk onto the end of *string\$*, making it two asterisks

h strings

long. It is then printed in line 60.

Line 70 similarly glues an asterisk on the end, line 80 then prints the whole string, and so on.

In describing the above program there was a "dead giveaway": I said that it contained "a lot of repetitions". If that's so, why didn't I use a loop? I rectify this in program III.

```
10 REM *** PROGRAM III ***
20 MODE 6
30 INPUT "How many times", number%
40 FOR loop%=1 TO number%
50 string$=string$+"*"
60 PRINT string$
70 NEXT loop%
```

Program III

This is the first time we've actually INPUT the loop parameter, in this case *number%*. This means that we leave specifying how many times we perform the loop until the program is actually running!

Line 50 contains the heart of the program. Each time through the loop it increases *string\$* by one asterisk then prints it out. The result's a neat looking triangle of asterisks!

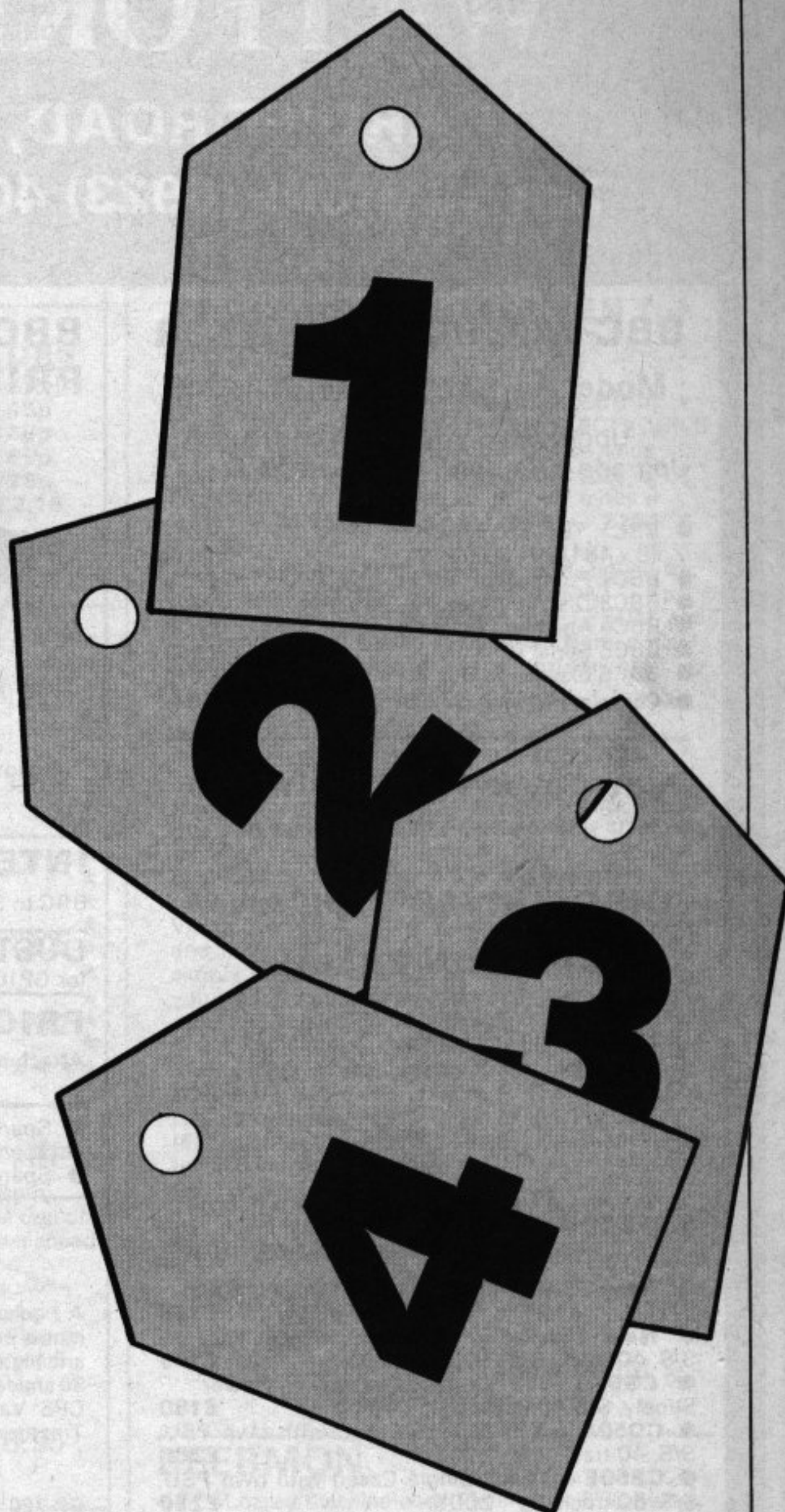
Try entering low values for *number%* at first. What happens if you enter 0?

Now that we understand the LEN() function, we can achieve the same results as Program III with a REPEAT... UNTIL loop. Look at Program IV.

```
10 REM ** PROGRAM IV **
20 MODE 6
30 INPUT "How many times", number%
40 REPEAT
50 string$=string$+"*"
60 PRINT string$
70 UNTIL LEN(string$)=number%
```

Program IV

Here we simply repeat until the length of *string\$* has reached *number%* (The length of *string\$* increases by one each time through the loop so we can use it to



keep track of how many times we've "looped".)

Try Program V.

```
10 REM *** PROGRAM V ***
20 MODE 0
30 offset%=64
40 FOR loop%=1 TO 26
50 string$ = string$ + CHR$(offset% + loop%)
60 PRINT string$
70 NEXT loop%
```

Program V

This uses the same idea as Programs III and IV. Line 50 simply increases the string by one character each time through the loop. The character is determined by the CHR\$() function. The first time through the loop it's 'A', the second time a 'B' is glued onto the

end of the 'A' and so on until we eventually have the whole alphabet.

Notice that line 20 puts the micro into Mode 0. This is so we can fit it all on the screen! You might want to return your micro to normal after the program with a MODE 6.

See if you can predict what happens if you changed line 50 to:

```
50 string$ = CHR$(offset% + loop%) + string$
```

Finally, can you alter program V so that it still prints out its "alphabetic triangle", but with the alphabet reversed? That is, so that it goes:

```
Z
ZY
ZYX
ZYXW
....?
```


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Upgrade your Model A with our Upgrade Kits and save yourself £ s s s

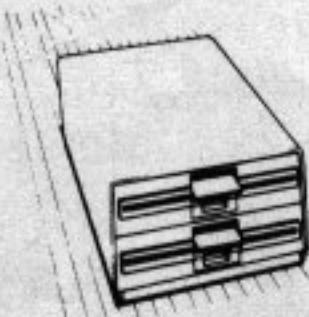
- BBC1 16K Memory (8 x 4816AP-3 100nS) £20.00
- BBC2 Printer User I/O Port £7.10
- BBC3 Disc Interface Kit £85.00
- BBC4 Analogue I/O Kit £7.25
- BBC5 Serial I/O Kit £7.50
- BBC6 Expansion Bus Kit £6.75
- Complete Mod. A to B Upgrade Kit £48.00

Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies. £3.95

DISC DRIVES (CUMANA)

BBC COMPATIBLE



- New TEAC Slimline Uncased Drive S/S 40 track, 5 $\frac{1}{4}$ ", 100K £135
- New TEAC Slimline Cased without PSU, S/S, 40 track, 5 $\frac{1}{4}$ ", 100K £155
- CS50A — TEAC Cased with own Power Supply, S/S 40 track, 5 $\frac{1}{4}$ ", 100K £180
- CD50A — TEAC Twin Cased with own PSU, S/S, 40 track, 5 $\frac{1}{4}$ ", 200K £350
- CS50E — TEAC Single Cased with own PSU, S/S, 80 track, 5 $\frac{1}{4}$ ", 200K £250
- CD50E — TEAC Twin Cased with own PSU, S/S, 80 track, 5 $\frac{1}{4}$ ", 400K £475
- CS50F — TEAC Single Cased with own PSU, D/S, 80 track, 5 $\frac{1}{4}$ ", 400K £310
- CD50F — TEAC Twin Cased with own PSU, D/S, 80 track, 5 $\frac{1}{4}$ " 800K £599
- MITSUBISHI Slimline — Uncased, double density. Double track, 5 $\frac{1}{4}$ ", 1 Megabytes, track density 96TPI, track to track access time 3mSec. Plugs directly to BBC Micro. ONLY £220
- SINGLE MITSUBISHI Slimline — Cased with own PSU, DS/DD, 1 Megabytes. (400k with BBC) £275
- TWIN MITSUBISHI Slimline Cased with own PSU, DS/DD, 2 Megabytes. (800K with BBC) £535
- Single Drive Cable for BBC Micro £7
- Twin Drive Cable for BBC Micro £10
- Dual SWITCHABLE DRIVES, 40/80, 400K. Cased with own PSU, Slimline £495

5 $\frac{1}{4}$ " DISKETTES

5 year warranty

- 10 Verbatim or 3M Diskettes, 5 $\frac{1}{4}$ ", S/S £20
- 10 Verbatim or 3M Diskettes, 5 $\frac{1}{4}$ ", D/S £30
- 2 year warranty
- 10 WABASH Diskettes, 5 $\frac{1}{4}$ ", S/S £15
- 10 WABASH Diskettes, 5 $\frac{1}{4}$ ", D/S £25
- Carriage on Drives £7

DISC ALBUMS. Attractively finished in beige leatherlook vinyl. Stores, protects and displays 20 Discs in double-sided clear view pockets.

Only: £4.95

PLASTIC LIBRARY CASES

for Disc Storage 5 $\frac{1}{4}$ " (holds 10) £2

BBC PRINTER

GP100A



10" Tractor Feed,
80 columns, 30CPS
Normal & Double width Char,
Dot res graphics. Parallel Interface standard.
ONLY £170 (£7 carr.)

INTERFACE CABLE

BBC to Seikosha Cable £10.00

DUST COVER

for GP100 £3.95

FRICTION FEED

Attachment for GP100A or 250X Printers £22

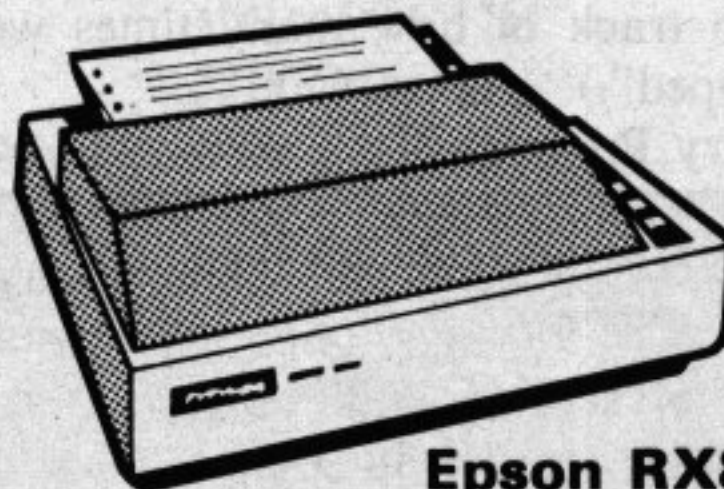
- Spare RIBBON for GP80 £4.50
- Spare RIBBON for GP100 £4.95
- Spare RIBBON for GP250 £5.95

SEIKOSHA GP-700

A 7 colour graphic printer at the price of a standard dot matrix printer. Its unique 4 hammer method enables text and high res graphics to be drawn in 7 basic colours or 30 shades. 7 x 8 matrix. Up to 106 char. per line at 50 CPS. Variable line spacing to 1/120". Tractor or Friction feed. Centronix interface standard.

ONLY £375 (£7 carr.)

GP-700 Colour Printer Screen-dump routine in ROM FOR BBC Micro £12



Epson RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Characters. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY £255 (£7 carr.)

RX80 F/T PRINTER: As above but has both Friction and Tractor feed £284

Epson FX80 Printer

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY £369 (£7 carr.)

RX & FX INTERFACES

| | |
|----------------------|--------|
| RS232 | £38.00 |
| RS232 plus 2K Buffer | £75.00 |
| IEEE 488 | £70.00 |
| Parallel 2K | £62.00 |

| | Ribbons | Dust Covers |
|--------|---------|-------------|
| MX80FT | £4.75 | £4.50 |
| MX100 | £10.00 | £5.25 |
| FX80 | £4.75 | £4.95 |
| RX80 | £4.75 | £4.50 |

PRINTER INTERFACE BUFFER

When your system tries to serve you well but its efforts are frustrated by slow printers delaying from returning to more productive tasks then this is where our Printer Buffer Interface comes to your rescue. Available in 16K or 48K memory sizes. Simply connect the integral cables to your Micro and the Printer and switch on. The free standing compact unit (130x 135x40mm) is supplied complete with interface cables, a power supply and a comprehensive manual.

Price: (16K) £120

BROTHER 8300 DAISY WHEEL PRINTER/TYPEWRITER

Provides high quality type in six interchangeable styles. Ideal for business use. Friction feed; 11 cps; 12 inch max. width; 5 different colour ribbons; portable; hard top cover with carrying handle; connects directly to BBC Micro.

ONLY £395 (£7 carr.)

| | | | |
|-------|-------------------------|-----------------|------|
| ***** | | | |
| ★ | ★ SPECIAL XMAS OFFER ★ | ★ | ★ |
| ★ | Cumana CS50A Drive..... | £180 | £165 |
| ★ | Cumana CS50F Drive..... | £310 | £275 |
| ★ | Cumana CS50F Drive..... | £599 | £530 |
| ★ | Seikosha GP100A | | |
| ★ | PRINTER..... | £170 | £155 |
| ★ | Seikosha GP250X | | |
| ★ | PRINTER..... | £225 | £199 |
| ★ | Epson FX80 PRINTER..... | £369 | £349 |
| ★ | ***** | | |

LISTING PAPER

8 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ " Fanfold paper plain or ruled (1000 sheets) £7 (£1.50p carr.)

15" Fanfold paper (1000 sheets) £9 (£1.50p carr.)

Teleprinter Roll (econo paper) £4 (£1.50p carr.)

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, etc., Printers.

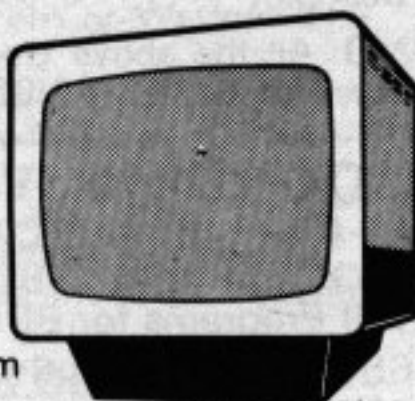
ONLY £10

Special Extra long (60") Cable £14

A complete word processing package consisting of: BBC Model B, Zenith 12" Green Monitor, Twin 200K highly reliable (1 year warranty) Twin Cased Disc Drives with own power supply, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother 8300 Daisy Wheel Printer/Typewriter, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software tapes, 10 blank diskettes, 500 sheets of Fan-Fold paper, Manuals and all the leads. All you require is a mains power point to have it up and running (we even supply the 4 way mains socket).

(P.S. We will alter the package to suit your particular requirement. Call in for a demonstration.)

14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **£215** (carr. £7)



- **KAGA RGB 12" Medium Resolution Colour** **£219**
(Carr. £7)
- **KAGA RGB 12" High Resolution Colour** **£259**(carr. £7)
- **BNC Connecting Lead** **£3**
- **RGB Connecting Lead** **£5**

ZENITH 12" Green Monitor.
Hi-resolution **£75** (£7 carr.)

Top quality Siimline, portable Cassette Recorder for Computer use. Mains/Battery, operated with counter. **£24.99** (C) **£1.50**

£24.00 (Carr. £1.50)

For our Cassette Recorder to BBC Micro **£2.00**

CASSETTES C12 Computer grade in library cases **40p**

STACK PACK The unique Cassettes drawer rack system including 10 off C12 Computer Cassettes **£6**



The Unique Graphic Tablet

Watford Electronics' BEEBLOTTER will work with 32K BBC Micro. Connects to Analogue port. The unique design makes it accurate and simple to use. Attractively finished. The comprehensive booklet supplied describes its use in detail and shows some of the possible applications.

The special features include:-

- * Works in all graphics mode and any colour selectable.
- * Commands printed on Tablet and On-screen instructions.
- * Special routines enable pictures to be quickly loaded from tape.
- * Works with all operating systems and ECONET. Tape and Disc versions available.
- * Large drawing area (32cms x 23cms).
- * Maps, Pictures and Diagrams produced quickly and easily.
- * Transparent tablet enables maps and diagrams to be copied directly from books.
- * Commands include line, circles and rectangle drawings, infilling, full editing and an easy to use copy and move feature.
- * Screen dump routines included for Seikosha and EPSON printers.
- * Routines are included to allow user to incorporate pictures in their own programs.
- * Designed by a professional teacher with educational uses in mind.

ONLY £80 (£3 carr.)

| | |
|--|--------------|
| CASSETTE LEADS 7 pin DIN Plug | |
| to 5 pin DIN Plug + 1 Jack Plug | £2.00 |
| to 3 pin DIN Plug + 1 Jack Plug | £2.00 |
| to 7 pin DIN Plug | £2.50 |
| to 3 Jack Plugs | £2.00 |
| 6 pin DIN to 6 pin DIN Plug (RGB) | £2.50 |
| Monitor Lead, BNC to PHONO | £3.00 |
| Disc Drive to BBC Micro Power Lead | |
| Single: £3.00 Dual £3.75 | |

| | <i>Plugs</i> | <i>Sockets</i> |
|------------------------------|--------------|----------------|
| RGB (6 pin DIN) | 30p | 45p |
| RS423 (5 pin Domino) | 30p | 40p |
| Cassette (7 pin DIN) | 25p | 65p |
| ECONET (5 pin DIN) | 15p | 25p |
| Paddles (15 pin 'D') | £1.10 | £2.15 |
| Disc to BBC Power Plug 6 pin | 70p | - |
| Disc Drive Power Plug 4 pin | 60p | - |

★ ★

★ ★ ★ SPECIAL XMAS OFFER ★ ★ ★

★ Microvitec 1431

★ MONITOR.....~~£225~~ £209

★ Microvitec 1451

★ MONITOR.....~~£370~~ £319

★ KAGA I MONITOR

★ RGB.....~~£219~~ £205

★ Zenith 12" Green

★ MONITOR.....~~£75~~ £72

★ ★

Thousands of people have already benefited from LISTEN & LEARN touch typing. You could be one of them in just 10 days. You progress at your own speed through step-by-step recorded instructions and carefully prepared exercises. Big keyboard diagrams help you learn to use all your fingers. The package includes: 2 specially recorded cassette tapes; Easy to use Flip Chart; 17 Keyboard diagrams; Professional typing exercises; Full explanatory text. An ideal Christmas gift.

Only £6.95

Are you wondering where to fit new ROM based software inside your computer in addition to the BASIC, WORDPROCESSOR, DFS, and FORTH ROMS? Then our add-on 13 ROM Socket Board is the answer. Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 4 solder connections to be made. Full instructions are supplied.

Our 13 ROM SOCKETS BOARD enables the User to increase the Sideways ROM capacity the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All essential lines are buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

ONLY £29.95 (carr. £1)

| | 1+ | 25+ |
|-------------|--------------|--------------|
| 2764-25OnS | £4.20 | £3.75 |
| 27128-25OnS | £18 | £13 |
| 27128-400nS | £16 | £14 |
| 8271 | £36 | |

| | |
|-----------------------|--------|
| 6116-150nS (2K) | £3.40 |
| 6264-150nS (8K) | £30.00 |

At last! — the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes — 2716 — 2516 — 2532 — 2564 — 2764 — 27128.

This extremely powerful system is designed for your needs of TODAY & TOMORROW! - BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

- **COMPLETELY SELF CONTAINED** – Housed in its own sturdy case – Uses its own Power Supply – Connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT** – Comes complete with simple to use ROM based software – Facilities include Verification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does NOT simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE** – Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 and PRESTEL Adaptors without having to disconnect everything.

You don't need just any Eprom Programmer – you need **WATFORD ELECTRONICS EPROM PROGRAMMER** System.

ONLY £89 (£2 carr.)

(Price includes software in ROM and Manual)

A ROM based machine code Monitor for BBC Micro. It enables machine code programs to be debugged and altered easily and quickly. Being a ROM, its commands are always readily available and occupy no user memory. Appears to take no base page and only one page of relocatable workspace (256 bytes) and no more anywhere in RAM. Beebmon can do more than any other machine code monitors currently on the market. The special features include facilities like: TABULATE, MODIFY, FILL, COPY, COMPARE, SEARCH (HEX & ASCII) CHEKSUM, DISASSEMBLE, RE-LOCATE and by Emulating the 6502 processor, SINGLE STEP, BREAK POINTS ON READ/WRITE/EXECUTE OF LOCATION also BREAK POINTS ON A, X & Y REGISTERS are provided. HAS WINDOWS INTO MEMORY & TEST WINDOWS. All this and more for only: **£25**

All parts available as per Acorn User's 'SHINE A LIGHT' Light Pen article.

Kit Price: £8.95

A ready-made Light Pen for BBC Micro. Enables you to produce drawings on your own TV/MONITOR screen. Supplied complete with Software Cassette and instructions.

ONLY: £17

WATFORD ELECTRONICS

Continued

★ THE ULTIMATE ★ BBC MICRO DFS

by Watford Electronics

Highly acclaimed at the Acorn User Show. What do the independent press say?

Good Value for Money—Beebug Aug. '83
A very worthwhile package—The Micro User Sept. '83

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

* The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

* A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

* A DISC VARIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

* A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidentally deleted files and can save weeks of work.

* A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.

* A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

* When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

* Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1200, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 271K5 long.

* An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

* RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command

* OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.

* 1.75K of RAM can be taken over from the DFS for your large BASIC programs while still retaining LOAD, SAVE and *CAT and other simple commands.

* Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

* Fully compatible with BBC TELETEX and TORCH Systems

DFS ROM only £39
Complete Disc Interface including our highly sophisticated DFS ROM and fitting instructions Comprehensive and clearly written DFS MANUAL. (P.S. This manual will only be sold to those who purchase our DFS.) £7.50 (no VAT)

P.S.
We will exchange your existing ACORN DFS or AMCOM (PACE) DFS for the highly superior Watford's DFS ROM for £35

ONLY THE BEST AT
WATFORD

BBC FORTH on Cassette

Follows FORTH-79 standard and has fig-Forth facilities
—Runs faster than BBC BASIC.

ONLY £13

FREE 70 page manual and a Summary card.

BBC FORTH TOOLKIT

Adds many more facilities to the above BBC FORTH.
Supplied complete with 64 page manual. Only £9

RESERVED

This space is reserved for yet another of our ROM based software for BBC Micro. For details please read our advert in the next issue of this magazine.

Computer Concept's Firmware

BEEB-CALC

£33

A ROM based spreadsheet program, like wordwise this firmware is fast and simple to use — yet is a powerful spreadsheet analysis program, considerably better than the original 'calc' program — full floating point maths. Works in 40 or 80 column screen modes — variable column widths. Works with either cassette or disc. This ROM coupled with Wordwise can turn your micro into an ideal small business machine.

DISC DOCTOR

£26

A sophisticated Disc Utility ROM with many useful commands. (For detail description please refer to Computer Concept's advert in this magazine.)

TERMI

£26

Computer Concept's Terminal Emulation ROM

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

★ SPECIAL XMAS OFFER: only £32 ★

DISASSEMBLER

Will generate fully labelled assembly listings of any machine code program. Data is automatically differentiated from code and displayed together with its ASCII equivalent. Assembly listing can be saved in *EXEC format and subsequently incorporated into user programs.

Cassette: £6.95

Disk: £8.95

EMULATOR

An extremely powerful and flexible machine code interpreter. Allows you to write and debug machine code as easily as BASIC. Features single step, breakpoint register display, edit modes, etc.

Cassette: 7.25

Disk: £9.25

VIEW Acorn soft's Wordprocessor ROM.

£52

ACCESS ORDERS BY TELEPHONE

Simply phone your order through. We do the rest
(0923) 50234)

FORTH ROM for BBC

This superb (FIG FORTH) compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Manual included.

£36

GEMINI'S BUSINESS SOFTWARE

Written by professional Chartered Accountants and coded by competent programmers. Ideal for small and medium sized companies. Now available from stock.

| | |
|-------------------------------|--------|
| Cashbook Accounts | £52 |
| Final Accounts | £52 |
| Invoices & Statements | £17.25 |
| Commercial Accounts | £17.25 |
| Mailing List | £17.25 |
| Database | £17.25 |
| Stock Control | £17.25 |
| Home Accounts | £17.25 |
| Beebcalc Spreadsheet Analysis | £17.25 |
| Beebplot | £17.25 |

N.B. All the above Gemini software is on tape. For Disc Based (40/80 track) please add £3.

BOOKS (No VAT on Books)

| | |
|--|--------|
| 30 Programs — BBC Micro | £4.95 |
| 30 Hour BASIC (BBC Micro) | £6.00 |
| 100 Programs for BBC Micro | £6.95 |
| 6502 Application Book | £10.25 |
| 6502 Assembly Lang. Programming | £12.50 |
| 6502 Assembly Lang. Subroutines | £11.80 |
| 6502 Software Design | £10.50 |
| A young persons guide to BBC Basic | £4.50 |
| ACORN ATOM Magic Book | £5.50 |
| Advanced 6502 Interfacing | £10.95 |
| Advanced 6502 Programming | £10.50 |
| Assembly Lang. Programming for BBC | £8.95 |
| Advanced Programming Techniques for the BBC Micro | £7.95 |
| BBC Basic | £7.95 |
| Assembly Lang. Prog. on BBC Micro | £7.40 |
| BASIC Programming for BBC Micro | £5.95 |
| BBC Forth | £7.50 |
| BBC Lisp | £7.50 |
| BBC Micro An Expert Guide | £7.50 |
| BBC Micro Graphics and Sound | £6.95 |
| BBC Micro ROM PAGING System Explained | £2.95 |
| BBC Micro Revealed | £7.95 |
| BBC Micro Instant Machine Code including Software Cassette | £34.00 |
| Creative Adventure Programs on BBC Micro | £6.95 |
| 36 Challenging Games for the BBC Micro | £5.95 |
| Creative Graphics Cassette (Acornsoft). Has 36 graphics programs | £8.95 |
| Creative Graphics on BBC Micro | £7.50 |
| Complete Programmer for BBC | £5.95 |
| Discover BBC Machine Code | £6.95 |
| Discover FORTH — Osborne | £11.25 |
| Easy Prog. for BBC Micro | £6.50 |
| 35 Educational Programs for BBC Micro | £6.95 |
| Further Prog. for BBC Micro | £6.90 |
| FORTH Programming (Sams) | £12.50 |
| Functional forth for the BBC Computer | £5.95 |
| Games on your BBC Micro | £2.95 |
| Games BBC Computer can Play | £6.95 |
| Getting Acquainted/Acorn ATOM | £7.95 |
| Graphs & Charts on BBC Micro | £7.50 |
| Intro to Micro Beginners Book (3 Ed.) | £9.90 |
| Introducing the BBC Micro | £5.95 |
| Let your BBC teach you to program | £6.75 |
| LISP | £9.25 |
| Micros in the Classroom | £4.90 |
| Practical Prog. for BBC & ATOM | £5.95 |
| Programming the 6502 | £10.75 |
| Programming the BBC Micro | £6.95 |
| PASCAL | £9.25 |
| Logo Programming | £8.95 |
| Mastering VISICALC (Sybex) | £11.95 |
| Structured Prog. with BBC BASIC | £9.50 |
| The BBC Micro Book, BASIC, SOUND & GRAPHICS | £7.40 |

NEW DISC-FIX ROM

This ROM is an integrated, menu-driven DISC MAINTENANCE PACKAGE. Using simple menu selections, with intelligible prompts for any input required, the user can recover data from damaged discs. Facilities include:-

- Full screen editing of sectors on the disc.
- Sectors can be found by file name or sector number.
- Files and sectors can quickly and easily be dumped to a printer for examination and possible subsequent modification.
- COPY: blocks of data can be copied from any point on the disc to any other point. Blocks can be as small as one byte and can be transferred anywhere in a sector.
- SEARCH: The disc can be searched for any string, starting and finishing at any designated sector.
- VERIFY: Any block of sectors can be checked for their validity.
- FORMAT: Any track or group of tracks can be individually formatted to Acorn or Watford DFS standard.
- INSERT: Allows the manual creation of new directory entries to allow "undeletion" of files.
- BACKUP: This is similar to normal DFS backup but allows recovery after a disc error. Completely compatible with both Acorn and Watford Disc Filing Systems. Instruction manual supplied.

Price **£19.00**

TINY PASCAL (in 16K ROM)

PASCAL-T is capable of compiling source PASCAL into a compact very fast threaded-interpreters-code. Full editor and disc support are included. Comprehensive documentation supplied **£59**

EDUCATION Software

JUNIOR MATHS PACK (32K) **£6.95**

Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

MATHS TRANSLATIONS **£5.50**

This package explains how to translate Triangles and Quadrilaterals, moving these geometrical shapes on a grid. It goes step by step through the concepts and the matrix calculations involved. Excellent software.

WORLD GEOGRAPHY (32K) **£7.00**

Beautifully drawn Hi-Res colour map of the world illustrates and aids this graded series of tests on capital cities and populations of the world.

WORDHANG **£7.80**

(Age 7-13). A word guessing program based on the well known Hangman game. Uses full colour graphics. Complete with 260 words and the facility save your own list of words.

WORLDWISE **£7.80**

(Age 7-15). Two constructive geography programs allowing children to build detailed data bases covering both the UK and the world. Encourages children to refer to atlas and reference books. Save the database anytime.

ANIMAL/VEGETABLE/MINERAL **£4.95**

(Age 7-13). Provides an opportunity for children to teach the computer to differentiate between objects. The program tries to guess the object the child has thought of, using personalised responses like Mmm ... I am thinking.

BRITISH GEOGRAPHY **£6.95**

Teaches a child the locations of Cities and Ports using directional keys.

CAROUSEL **£5.50**

Aimed at junior school age. Sequences of colours and sounds teaches a child to concentrate.

HAPPY NUMBERS **£7.80**

(Age 4-6). No reading skills are required to use this colour graphics number recognition and counting program. Children build patterns of flowers corresponding to figures, quickly learning their significance.

INTRO TO ARITHMETIC **£10.45**

4 programs - Additions, subtractions, multiplications and divisions. Help stage, moving graphics and colours. Worksheet produced at the end of program. (5-7 years old).

BBC JOYSTICKS

Two versions available:

SINGLE: Player type
TWO Players type

£7.00 each
£11.50 per pair

NEW LAUNCH

★★★ PENG0 ★★★

One of the most sophisticated full colour, 100% machine code games software. This arcade game will give hours of fun. You (Peng0) are being harassed by the devouring Snobeas (Snow Beasties) whose diet is the Ice-cubes and an occasional juicy Peng0!! Your only means of survival is to hurl the ice-cubes at the marauding snobeas and crush them into the snow. Beware, as you crush them to death the remaining snobeas turn even more vicious. Each act will bring a new species, even more aggressive!!! All is not lost; Bonus points are won by lining up the three indestructible DIAMOND cubes. Progressive levels of difficulty. Bonus Peng0 at 30K points. A MUST for all BBC Micro owners.

Only: **£7.75**

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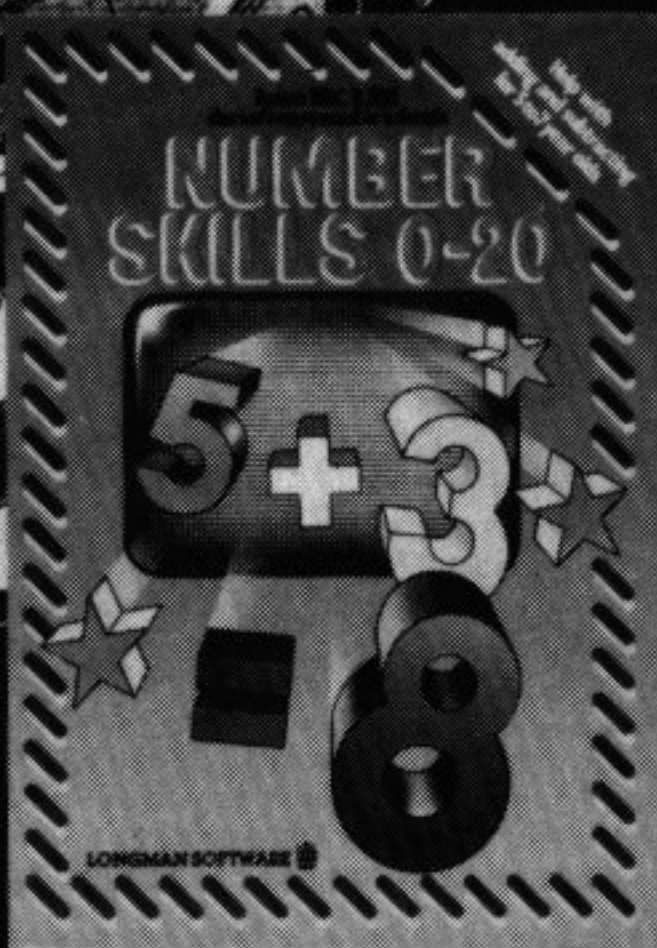
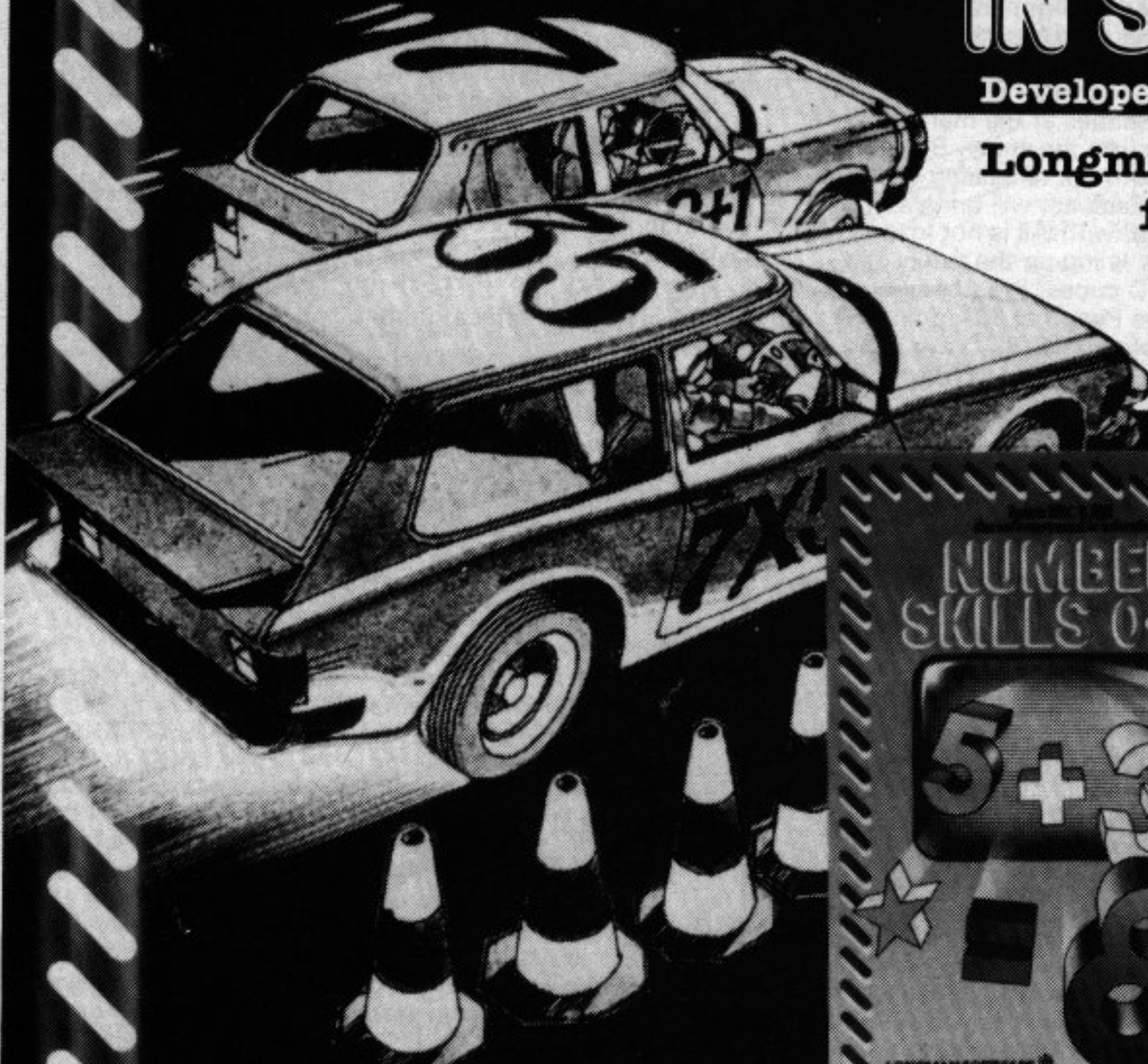
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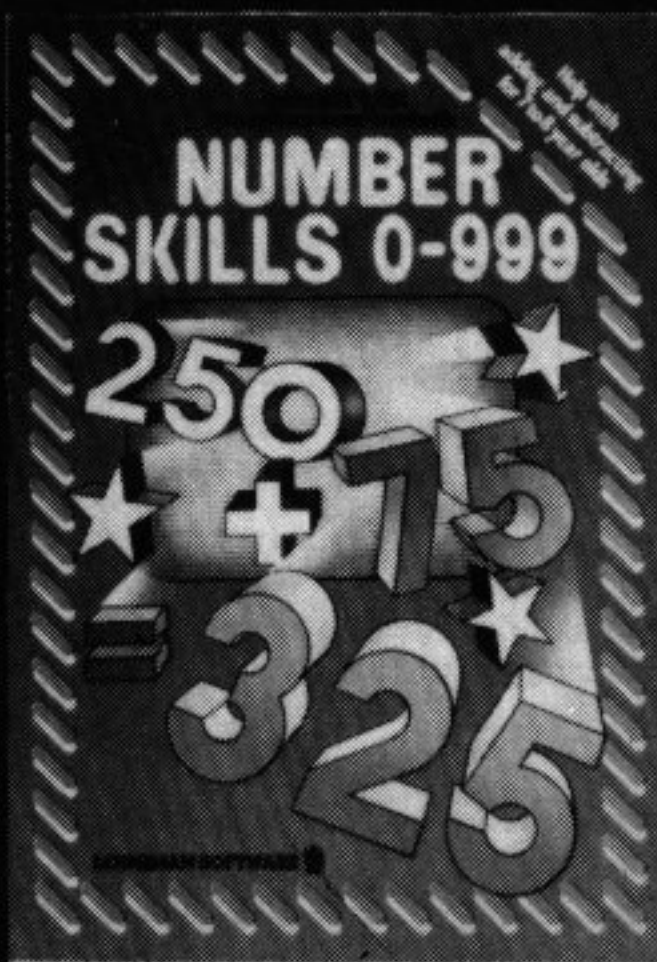
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LONGMAN SOFTWARE

ALEX BELL is the author of "Games Playing with Computers" and "The Machine Plays Chess?" Here he explains how you can test a chess program with some of the methods he has used over the last 20 years.

DID you know that there are 14,772,512 ways of placing 16 queens on a 16 by 16 chess board so that no queen attacks any other? Or that you can mate a black king on an infinite board with a white king, rook, bishop and knight?

Or that you can be a rotten chess player (like me) and still test and evaluate chess programs better than Bobby Fischer?

I was asked to comment on three BBC chess programs – *Acornsoft Chess* (£9.95), *BBC Soft White Knight* (£9.95) and *Computer Concepts Chess* (£8.95).

If you already have a chess program that allows you to set up positions then you can compare it with these (and other) programs using the following standard tests.

TEST 1: MATE TIMER

Ask the program to find two and three move mates from the opening position. The results were (in seconds):

| | 2 move | 3 move |
|------------------|--------|--------|
| <i>BBC Soft</i> | < 1 | 7 |
| <i>Acornsoft</i> | 9 | 257 |
| <i>Concepts</i> | 36 | > 600 |

BBC Soft was by far the fastest to report that there is no solution. Computer Concepts does not have a specific "mate in N" mode and has to be set to look at all moves at all levels down to three and five ply (a ply is a move by black or white). It chose P-K4 for a full three ply search and I got tired of waiting for the five ply response.

Acornsoft was intermediate but later testing showed that it does consider underpromotion which BBC Soft does not.

Testing the programs with genuine two move mate problems gave an average of about two seconds for BBC Soft, 50 seconds for Acornsoft and interminable for Concepts.

I was impressed by BBC Soft's speed and compared its performance using a problem that I have run on many other computers. The oldest machine was an ICL Atlas (circa 1963 and costing £3 million) with a program written in machine code which took four seconds – twice as long as a £10 program on a £400 micro. But the cycle times of the two machines are comparable – each could/can add about half a million numbers a second.

TEST 2: OPENING TRAPS

I always play black because there is

Chess for three gives the White Knight a winning gambit

By ALEX BELL

more opportunity to lay traps and none of the programs have a book to protect them from errors. All tests gave the programs about one minute on average to play their moves. The first game was against the Acornsoft which, without any forcing, played:

1. P-K4 P-K4
2. N-KB3 N-QB3
3. B-B4

A Giuoco Piano and black has some nice traps, for example the Blackburne shilling game where you offer up a pawn with 3. N-Q5 – I have never seen a program refuse this one unless protected by a book so (See Photo II):

4. N×P Q-N4

Dumb programs play N×P forking the queen and rook but Q×NP threatens mate in one and white is in deep trouble. Acornsoft played:

5. B×P+ K-K2
6. B×N Q×NP
7. N-B6+ KP×N
8. R-B1 Q×KP+
9. Q-K2 Q×Q++

Move seven is the classic "horizon

effect" – anything to put off the evil check and checkmate. The best line at move six is to castle (and lose the knight – BQ×N) followed by P-KB4.

To test BBC Soft I forced the first three moves and it played:

4. N×P Q-N4

as expected. However one of the nice features of BBC Soft is that it displays the "Best line" – what it thinks is its best move and what the opponent will probably reply down to four or five ply. It clearly saw that Q×NP was going to be trouble but it played the same line as Acornsoft:

5. B×P+ K-K2
6. B×N Q×NP
7. P-Q3 K×R+

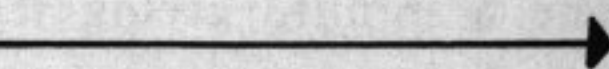
An unusual move to sacrifice the rook but it does give the black king a bolt hole.

8. K-Q2 Q×Q
9. K×Q R×B

and it's still playing, whereas Computer Concepts was just dumb:

5. N×BP Q×NP
6. R-B1 Q×KP+
7. B-K2 N-B3++

Another trap which can be tried from



From Page 39

white opening Giuoco Piano is the Wilkes-Barre line, thus:

1. P-K4 P-K4
2. N-KB3 N-QB3
3. B-B4 N-B3

which invites white to attack the weak KBP with N-N5. In fact, none of the programs would play this move (although it is all right if you know what you are doing) so I forced it on all of them. Concepts played:

4. N-N5 B-B4
5. N×BP B×P+
6. K×B N×P+
7. K-B3? Q-B3+
8. K×N P-Q4+
9. B×P Q-B5+
10. K-Q3 Q-Q5+
11. K-K2 B-N5+
12. K-K1 B×Q

BBC Soft also played 5. N×BP inevitable from move six when the king moved out towards the middle of the board.

White Knight also played 5. N×BP but the B×P+ made it think for over five minutes. It can do this because it only has to average one minute for each move (whereas Concepts sticks rigidly to its time for each move).

The "Best line" showed that it considered K-B1 for over half of the five minutes because the knight check is difficult to analyse. However greed overcame caution:

6. K×B N×P+
7. K-K3 Q-B3

This is better than Concepts but still greedy – if white retires the king it cannot have the black rook because of Q-B3, which either checks or threatens mate in one. But the best line is K-N1 because of the skewer or the following:

8. N×R Q-N4+
9. K×N P-Q4+
10. K×P N-N5+
11. K-B5 Q-K2+
12. K-N5 B-Q2+
13. K-R5 Q-B4++

Acornsoft was the only program to avoid the trap with the right move:

6. K-N1 Q-K2
7. N×R

and black has a poor game.

TEST 3: END GAME PROBLEMS

Comparison of end game abilities is difficult because the time settings on the programs differ. Concepts always sticks rigidly to its one minute for each move whereas Acornsoft has playing levels which have to be set higher for an end game to play at the test speed.

BBC Soft only averages its moves to one a minute giving it a definite

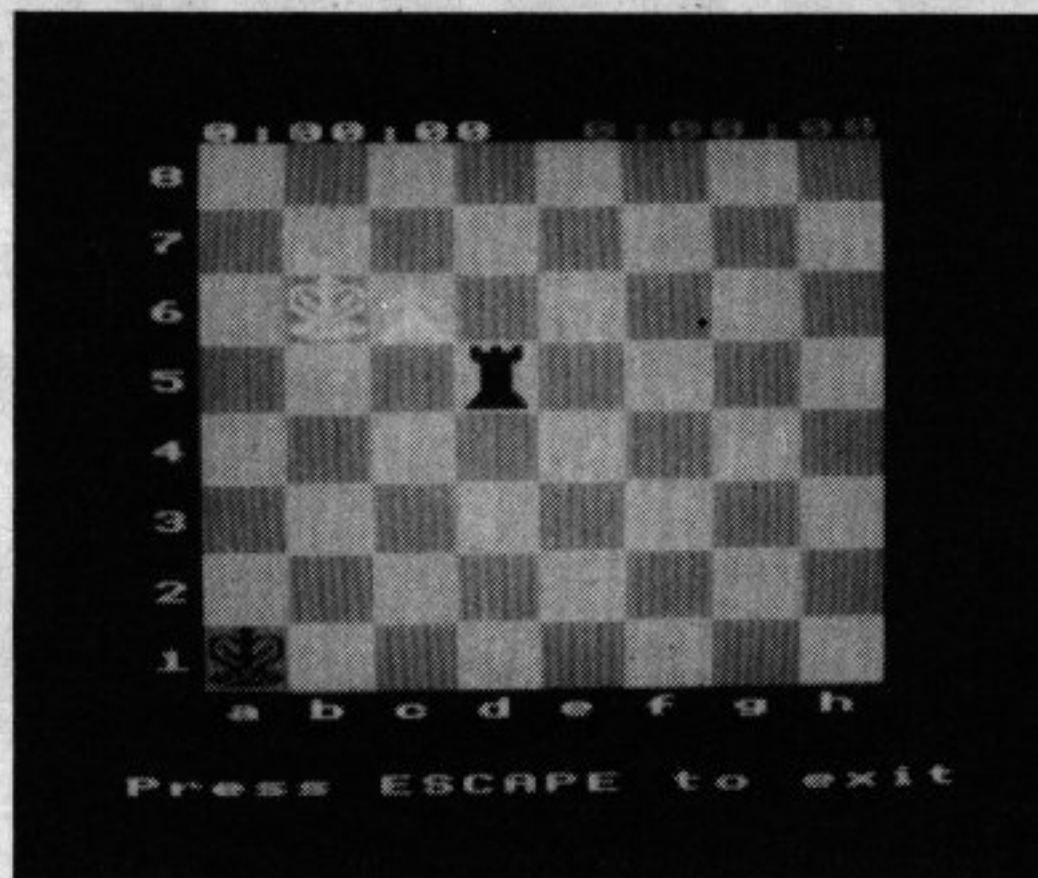


Photo I:
Acornsoft Chess



Photo II:
BBC Soft White Knight

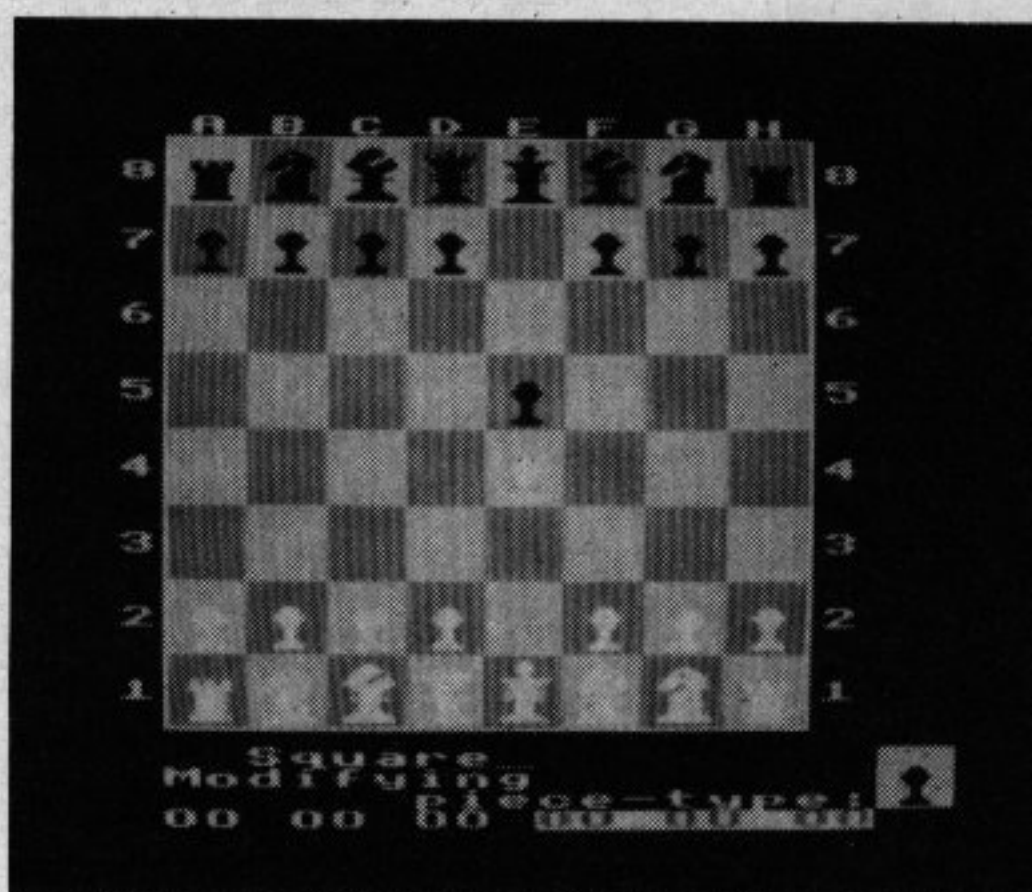


Photo III:
Computer Concepts Chess

advantage in difficult positions.

All the programs appeared capable of performing the king, queen versus king ending (Acornsoft needs level six or seven for this and announces its move with a chime) but the king, rook versus king ending was too difficult for all of them.

They all tend to move the king to the centre of the board but then have no idea what to do with it.

An interesting question is how do these micro-programs compare with the tournament programs running on large mainframe computers?

Consider the position in Photo I, a

famous problem which has baffled many people since the turn of the century and a good test of a program's appreciation of repetition of position.

Mainframe programs circa 1975 were just reaching the point where they could solve such problems because they could be set to a "play and win" mode, appreciating that repetition is a draw and underpromoting the pawns.

This is the way it worked. The pawn is given a value equal to a queen – a fiddle but nevertheless equivalent to what a human expert does when asked to solve the problem.

The only move that can keep this

valuable pawn is P-B7 so the program should play it without any further investigation of the consequences.

To misquote Sherlock Holmes: "When all possibilities except one are eliminated then the exception must be the answer".

Black must now check the white king, and white, in order to avoid draw by repetition and avoid losing the pawn with a skewer, must move steadily down the knight file until it can play K-QB2 which prevents the skewer threat.

Black might then play R-Q5 which threatens stalemate (if white queens the pawn then R-QB5+) but tournament programs in 1975 could search 11-ply ahead and see that the underpromotion to a rook is a win for white.

None of the micro-programs (playing black or white) had any idea of how to play this ending although BBC Soft does have a crude appreciation of repetition of position and Acornsoft can underpromote.

I give this example in order to justify my opinion that these programs' playing abilities are roughly equivalent to the state of the art about 10 years ago on the most powerful and expensive computers.

They are incredibly cheap in comparison and the modern micro is about 10 per cent of the speed of the giants of 10 years ago.

But they are obviously still limited, mainly by their store size (hence the lack of book openings and knowledge of how to play end games).

The store size will increase on the BBC Micro when the Tube arrives. This means that the display handling (which occupies about 10k in BBC Soft - about one third of the machine) can be done by the second processor and the programs should then improve their openings and end games dramatically.

However, it is invidious to compare the modern micro with its giant ancestors on purely chess playing ability.

The micro, with its interactive features and display monitor, can and does support vastly superior display and manipulation features over the old programs.

Ease of setting up positions and selecting options are important factors in designing micro chess programs and the display of information is also very important.

For example, BBC Soft display of

the "Best line" is an inspiration by its author, 23-year-old Martin Bryant, and a feature that will become a must for future chess programs.

To actually see what the program is thinking about while you wait for its move is quite fascinating, particularly when testing it with traps.

Another nice feature of BBC Soft is the simple setting of its playing speed to an average time for each move. When in trouble the program reacts in an intelligent fashion by taking longer to make its reply.

CONCLUSIONS

Concepts compared poorly with the other programs in almost every test and option. In terms of playing strength Acornsoft and BBC Soft are about equal, with Acornsoft rather easier to manipulate and with rather more options. It (and Concepts) allows you to save and reload a position with a filing system, an option BBC Soft's does not provide.

Nevertheless BBC Soft's "Best line" together with its very fast problem solving mode must give it the edge in terms of entertainment and value for money.

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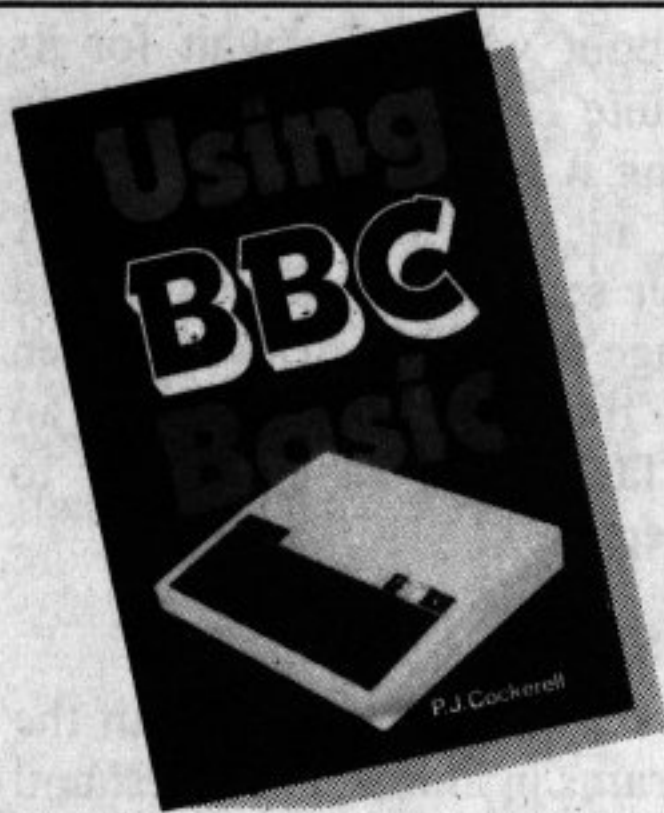
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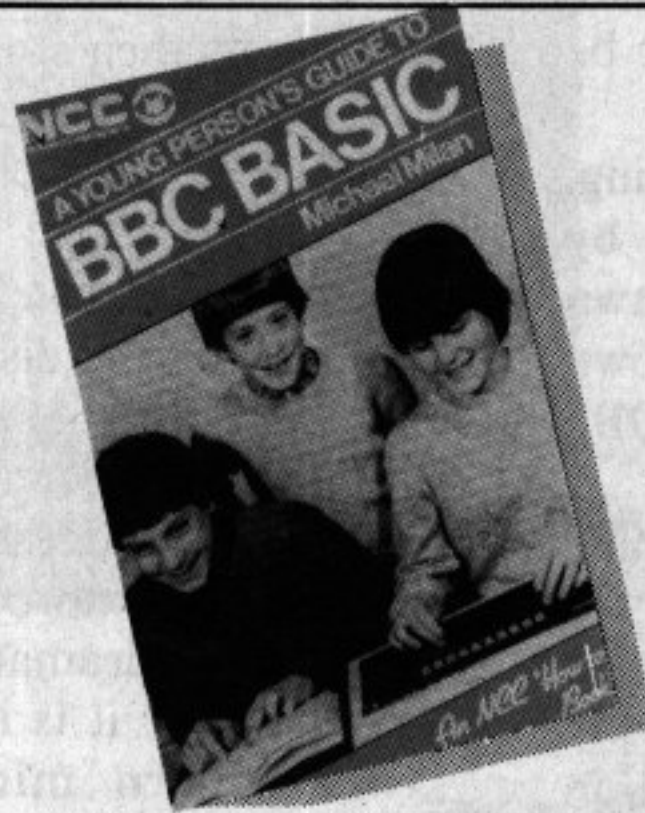


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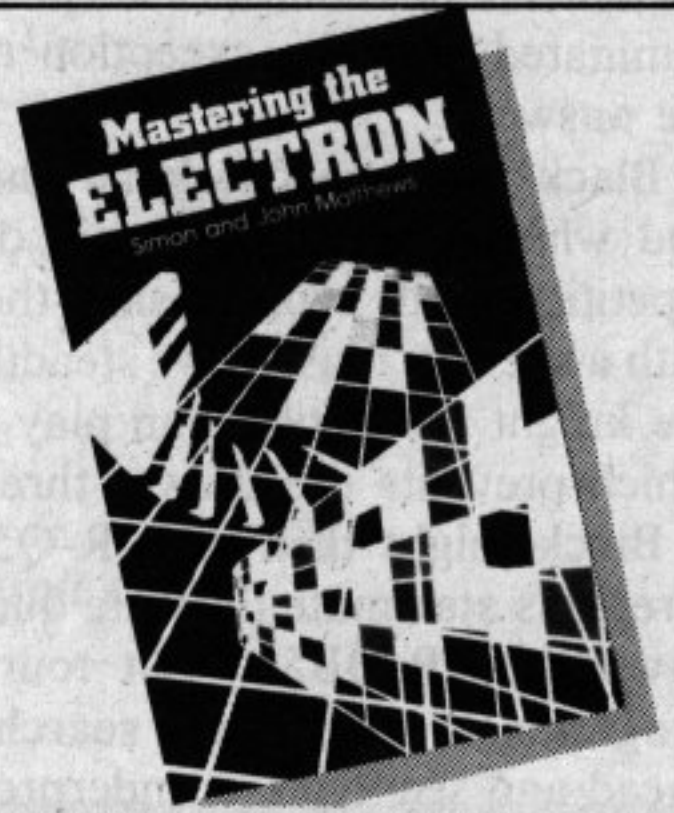
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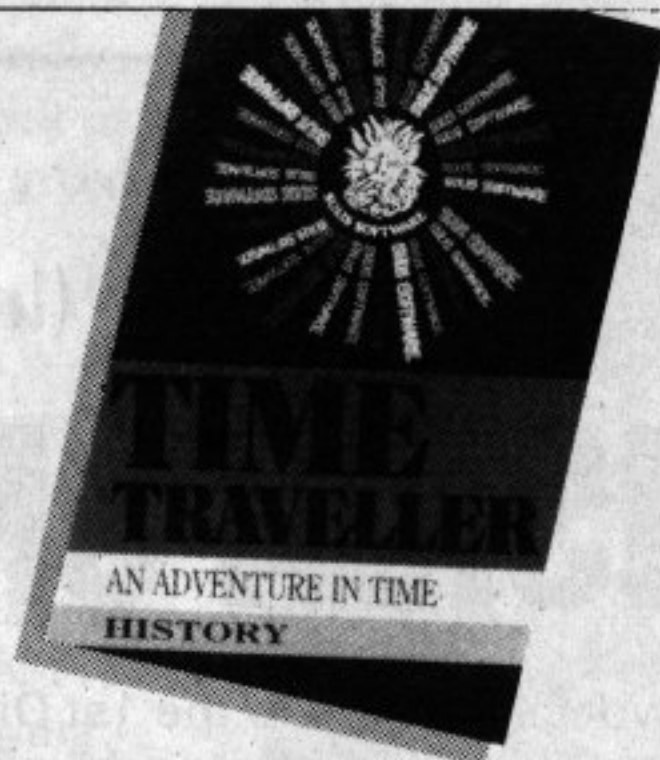
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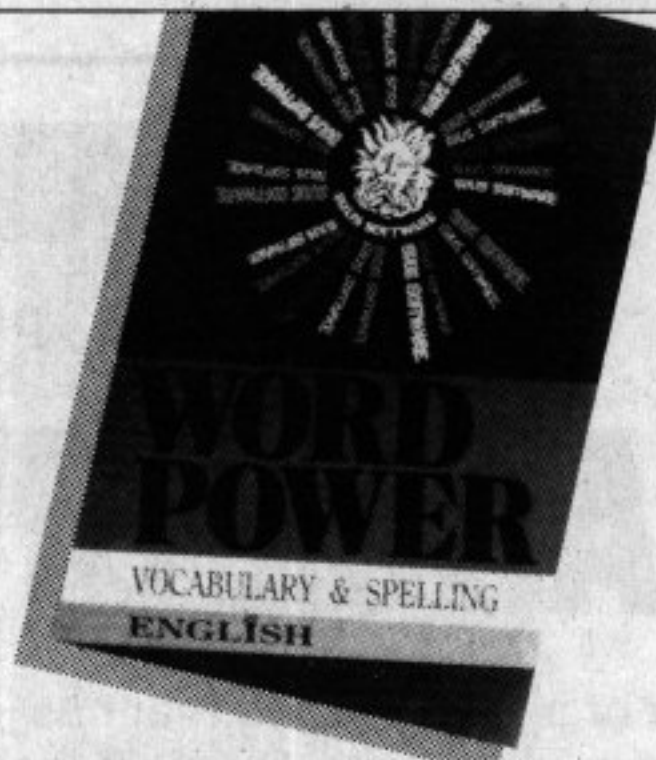
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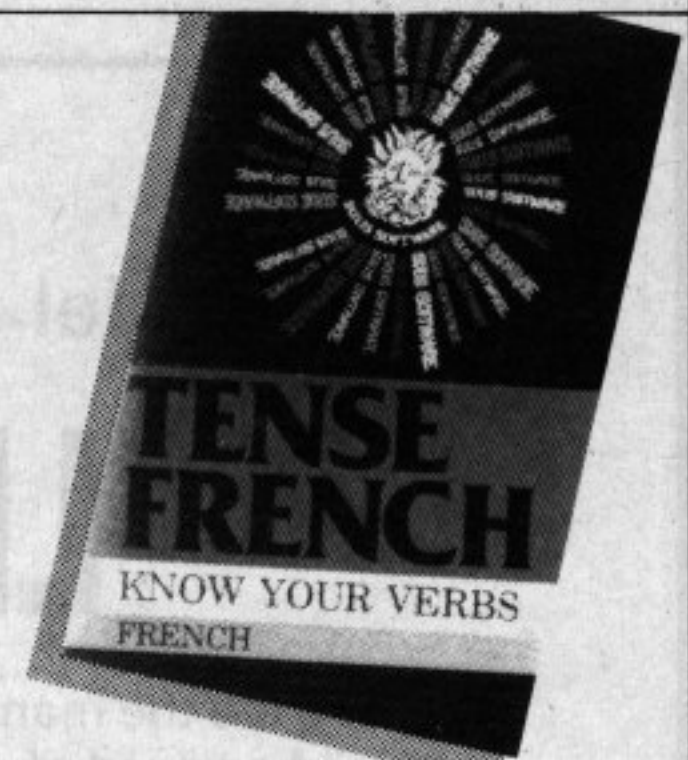
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THIS MONTH we are going to use the graphic methods we've already discussed, plus some new ones, to produce a seasonal offering — a Christmas tree with an appropriate greeting.

The finished product is Program VII. Before that, though, we'd better look at a few of the techniques it uses, the most important of which concern user defined characters.

These characters, as their name implies, allow you to use the PRINT statement (or VDU) to print out your own special characters on the screen.

In the BBC Micro's graphics modes, all the characters are drawn on an 8 × 8 grid, each cell of the grid being known as a pixel.

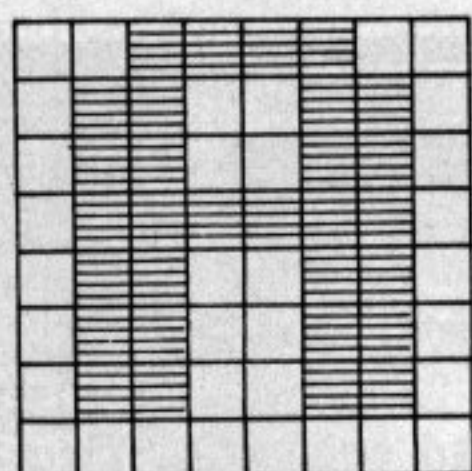


Figure I. Pixel pattern for the letter A

Figure I illustrates how the grid for the letter A is filled out. To print this letter by using its Ascii code simply enter:

```
PRINT CHR$(65)
```

Now the BBC Micro has several blank grids ready for you to fill. These grids have the Ascii codes 224 to 255.

Once you've filled, say, 224 with the required pattern of cells, to print out this user defined character, you type:

```
PRINT CHR$(224)
```

and it appears where the cursor is, with

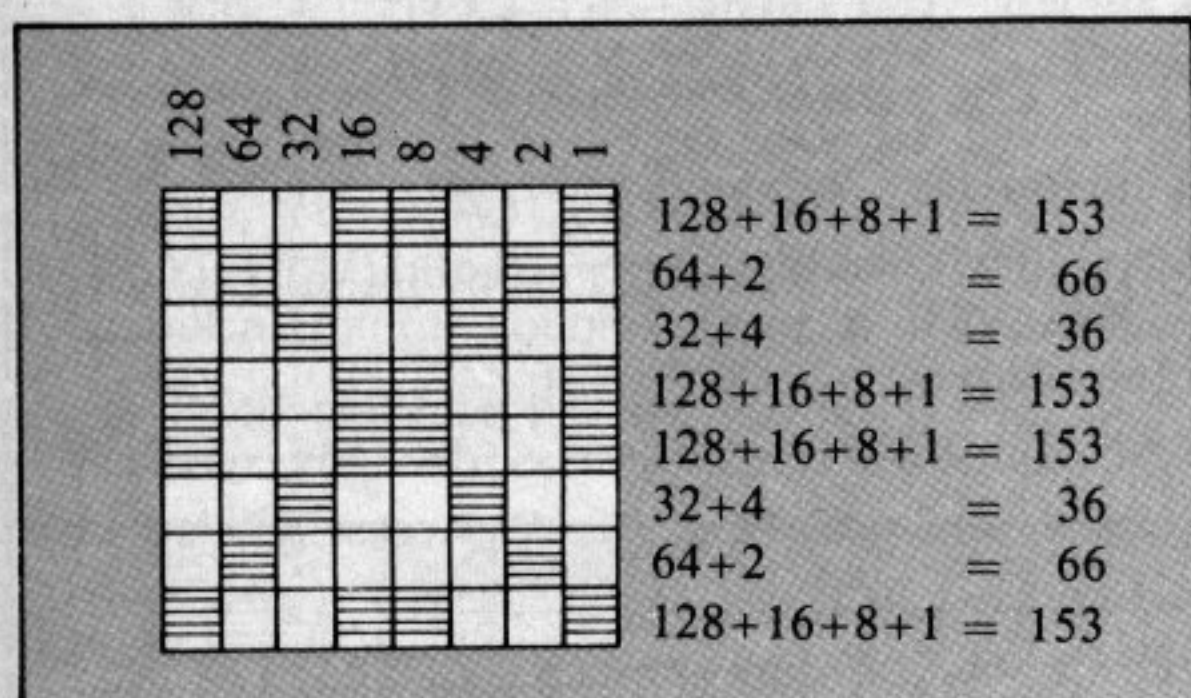


Figure II. User defined characters

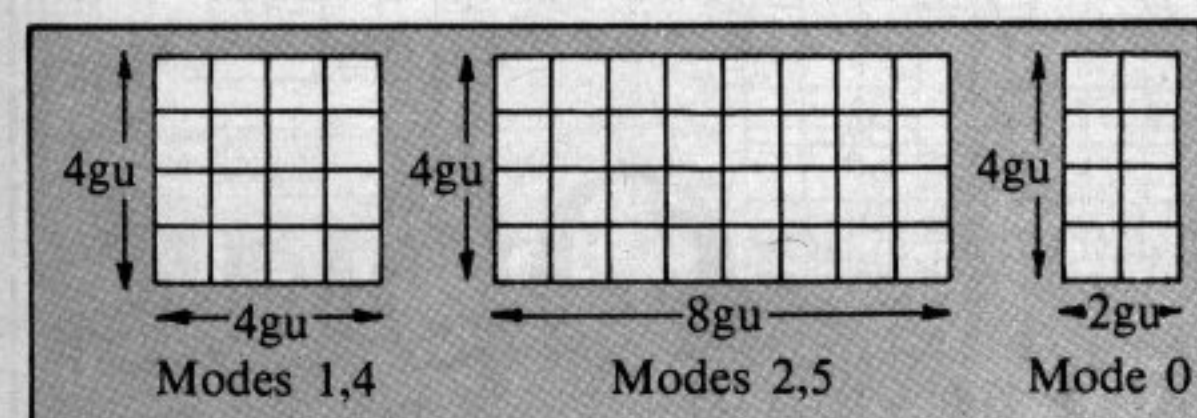


Figure III. Pixel sizes in each graphic mode

By
MICHAEL NOELS

the appropriate foreground and background colours.

Figure I illustrates how you can define your own character. You simply fill in the cells of the 8 × 8 grid until you get the pattern required. Then all that's needed is a few simple sums.

Each column of the grid has a value. The value of the rightmost column is 1, the one to its left 2, the one to the left of that 4, and so on, doubling each time until the leftmost column has a value of 128.

You may have noticed that these are the column values of a binary number.

Each row of the grid has a number calculated for it and you add together the column values of each cell shaded in that row.

Figure II shows the idea. Each row has its number. To teach the computer this pattern we use:

```
VDU 23
```

followed by the Ascii code we're going to use for it followed by the eight numbers we've calculated for the rows,

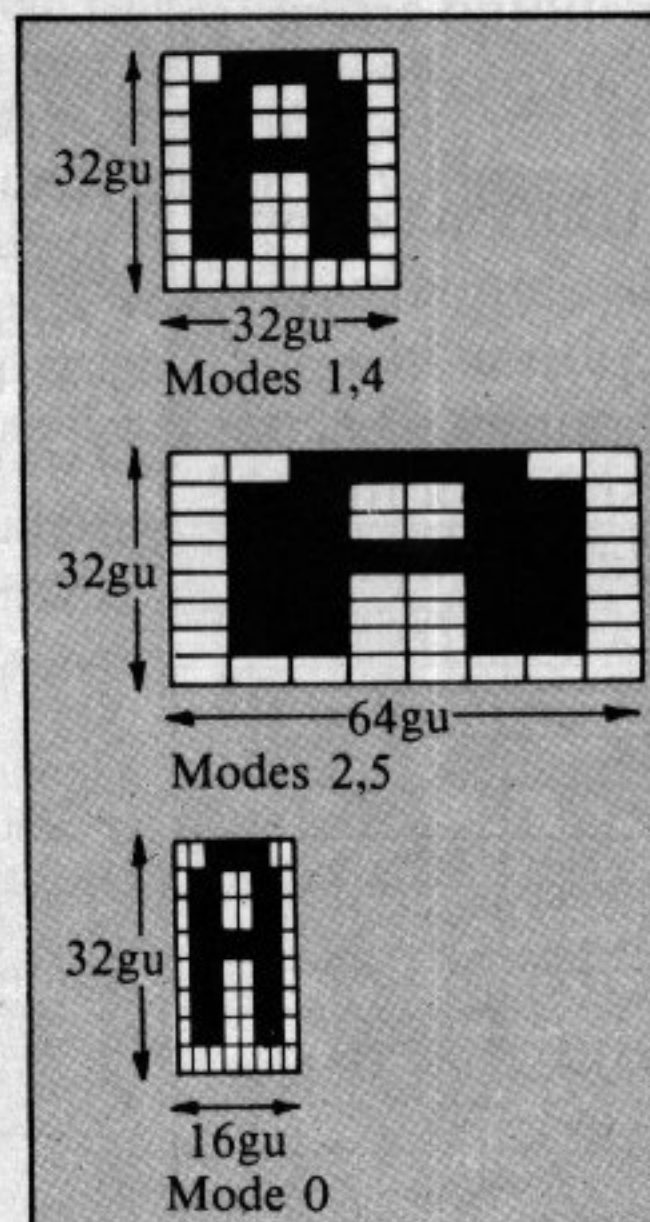


Figure IV. Character sizes in each graphic mode

```
10 REM *** PROGRAM I ***
20 MODE 4
30 VDU 23,224,153,66,36,153,153,36,
66,153
40 FOR IX=0 TO 19
50 PRINT TAB(IX,IX)CHR$(224)
60 NEXT IX
```

starting with the top and working down. All these are separated by commas.

So, to define character 224 to be the pattern shown in Figure II, we use:

```
VDU 23,224,153,66,36,153,153,36,66,153
```

Program I makes use of this character. Try altering line 20 to:

```
20 MODE 5
```

and notice the difference — the character is spread sideways. This is because the shape of the pixels in Mode 5 differs from that in Mode 4.

A pixel is the smallest point you can plot on a screen. Its size limits the resolution, or fineness, available.

As Figure III shows, in Modes 1 and 4, the pixel is four graphic units (gu) square, whereas in Modes 2, 5 and 0 it is variously oblong.

So when you print out an 8 × 8 pixel grid in Mode 4 it comes out square, whereas in Mode 5 the wider pixels stretch the figure. Figure IV shows the size of a character in each graphic mode in terms of graphical units.

You have to allow for this alteration in width when you are visualising your user defined character. I find it easier to see the character I want in terms of square pixels, so I've stuck to Mode 1 in Program VII even though it limits the range of available colours.

Let's try to print a pattern with our user defined character. We'll simply print the character three times, in a vertical line.

We can use the cursor control codes to ensure that the characters actually end up vertically aligned.

VDU 8 moves the cursor left

VDU 9 moves the cursor right

VDU 10 moves the cursor down

VDU 11 moves the cursor up

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| E.H.T. | Minimum 19.5kv Maximum 22.5kv | Minimum 19.5kv Maximum 22.5kv |
| VIDEO BAND WIDTH | 6MHz. | 10MHz. |
| DISPLAY | 80 characters by 25 lines | 80 characters by 25 lines |
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Program II illustrates the technique.

Remember that we can string VDU statements together. Line 40 works like this: 224 prints the character, leaving the cursor directly to its right. 8 moves the cursor back left and 10 moves the cursor vertically down, leaving it directly under the first character. 224 prints the character again. 8 moves the cursor left and 10 moves the cursor down so that 224 prints the character vertically under the other two.

We can also use:

PRINT CHR\$(8)

to move the cursor left, and so on for the other cursor movements. Although slightly longer, this has the advantage that we can add all the characters, user defined and cursor movement, into one string and then simply print out that string.

This results in the combined characters appearing far more quickly than with the VDU method. (See Program III.)

We use this technique in Program VII. Lines 210 to 290 each add together the user defined characters required to make the various shapes. Line 210, for example, defines a candle.

Notice how I use the name *candle\$* for the combined character string – it's

```
10 REM *** PROGRAM II ***
20 MODE 4
30 VDU 23,224,153,66,36,153,153,36,
66,153
40 VDU 224,8,10,224,8,10,224
```

```
10 REM *** PROGRAM III ***
20 MODE 4
30 VDU 23,224,153,66,36,153,153,36,
66,153
40 character$=CHR$(224)+CHR$(8)+CHR
$(10)+CHR$(224)+CHR$(8)+CHR$(10)+CHR$(
224)
50 PRINT character$
```

far more meaningful than, say, *shape1\$*.

In Program VII, the actual user defined characters are defined in lines 170 to 210, which read in the values for each VDU 23 from the DATA statements in lines 930 to 1060, 'VDUing' each parameter at a time (line 190).

Notice how -1 is used in line 1060's DATA statement to mark the end of the parameters.

When we print a user defined character, it prints, as we have seen, in the currently defined foreground and background colour.

Suppose, however, that we want a two-colour foreground, such that the centre pixels of our previous character and those in the middle of the outer edges are yellow, while the other pixels are red. (We'll leave the background black.)

You might think that we could do this by defining our character (224) as before and printing it in red, then overprinting it in yellow with another user defined character (225) containing only the pixels we want to be yellow. The red pixels should then show through.

Figure V illustrates the idea. However, it isn't as straightforward as this, as Program IV shows.

What happens is that the second character's background is printed, as well as its foreground, completely overwriting the first character!

We need some way of writing just the foreground of the characters – making the background transparent.

We can do this by using the command VDU 5. After such a command, the micro only prints the foreground of characters. This works not only for user defined characters, but for the whole character set as well.

There is one snag, though. VDU 5 also causes the characters to be printed not at the text cursor, but where the graphics cursor is.

Technically, we say that VDU 5 joins the text and graphics cursors. However, it's the graphics commands that are

```
10 REM *** PROGRAM IV ***
20 MODE 1
30 VDU 23,224,153,66,36,153,153,36,
66,153
40 VDU 23,225,24,0,0,153,153,0,0,24
50 COLOUR 1
60 PRINT TAB(19,15)CHR$(224)
70 COLOUR 2
80 PRINT TAB(19,15)CHR$(225)
```

```
10 REM *** PROGRAM V ***
20 MODE 1
30 VDU 5
40 VDU 23,224,153,66,36,153,153,36,
66,153
50 VDU 23,225,24,0,0,153,153,0,0,24
60 GCOL0,1
70 MOVE 640,512:PRINT CHR$(224)
80 GCOL0,2
90 MOVE 640,512:PRINT CHR$(225)
100 VDU 4
```

used to position the joined cursors – and to set colours – so I consider that VDU 5 causes characters to be printed at the graphics cursor.

This means that, after a VDU 5, to print a character at a certain location on the screen you have to place the graphics cursor there with the MOVE statement before PRINTing.

The numbers involved might take a bit more thought, but you gain two advantages. Firstly, you can position your character to the resolution of the screen, that is, within one pixel. With the TAB statement, you are limited to the eight pixel resolution of the character grid.

Secondly, of course, you only print the foreground of the character – there's no background to overwrite things.

Another useful aspect of operations after VDU 5 is that the cursor movement characters still work. For example, CHR\$(8) still moves the graphics/text cursor one whole character (eight pixels) left from its previous position. Try Program V.

Notice the use of VDU 4 at the end – this turns off the VDU 5. You should always tidy up this way – leaving VDU 5 in operation can cause problems. Try listing a long program with VDU 5 on to see what I mean.

Also, the relevant colours are the graphics colours, not the text colours, so we use GCOL0 instead of COLOUR.

A word of warning. Don't use TAB with VDU 5 on. Although you can get away with it in OS 0.1, your program won't work when you upgrade to later systems.

Now run Program VI. This has the

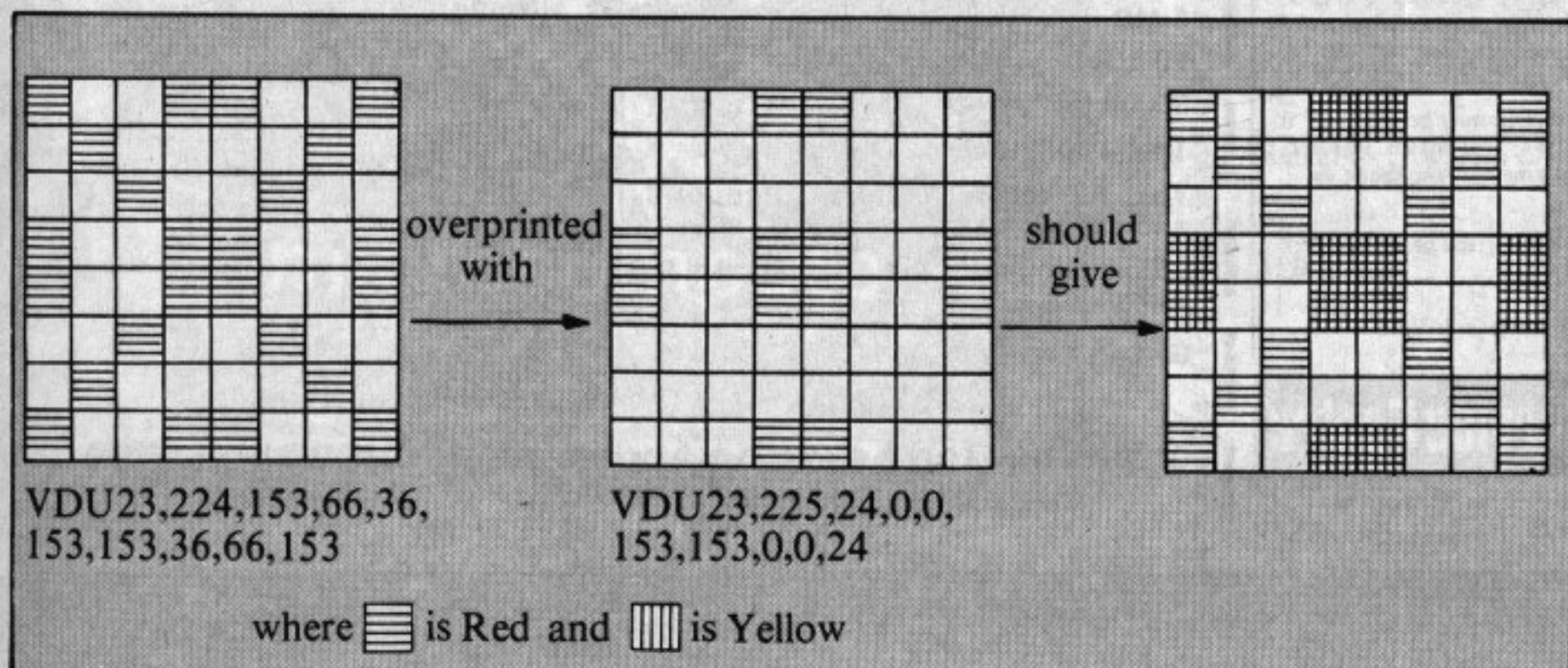
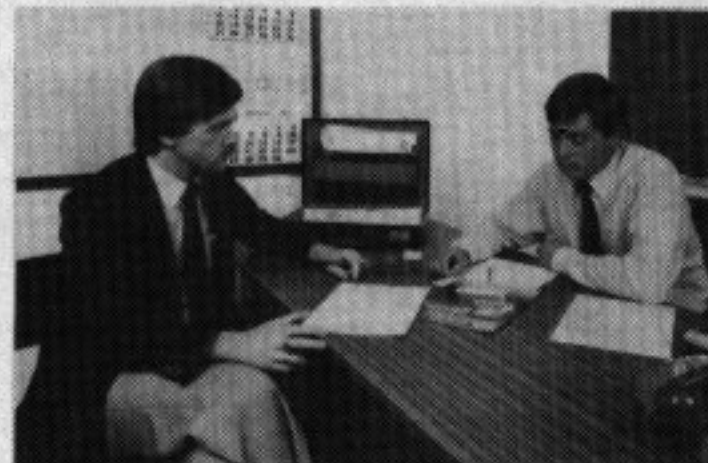


Figure V. Overprinting user defined characters

A NETWORKING MARRIAGE FOR THE BBC MICRO FROM GSL AND AMCOM



Rod Lewis(left), GSL's Sales Manager, discussing E-NET's speed, simplicity and versatility with a customer.

E-NET allows up to 200 computers to share a common, large central disc store, and overcomes many of the inconvenient features of earlier network systems.

E-NET uses a hard disc unit as the central disc store, allowing upwards of 8 Megabytes of storage. It has effective, simple structures to limit the disc space available to any user, and to permit access by any user to library programs. Many users of the few simple networks installed so far have complained of the difficulty of monitoring pupil's use of disc space, but E-NET overcomes all these problems by doing the monitoring for you. You simply allocate a space limit to each user on the Hard Disc using the

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GSL Analogue Signal Display & Analysis System for the BBC/Acorn (Model B) Microcomputer

This systems enables a BBC Microcomputer (Model B) to function as a two channel, large screen, storage oscilloscope, for frequencies up to high audio values.

The basic system comprises an analogue to digital interface unit which is connected to the computer via the 1MHz bus. The accompanying software package enables input signals to be displayed in the time domain and also, if required, analysed via fourier transformation to give frequency domain representation.

The main features of the system are:

1. Two channel, large screen, display of signal amplitude vs time, with grid scaling information, channel identification and pk/pk measurement.
2. Repetitive or externally triggered sampling of input signals.
3. Display time (total sampling period) variable from 0.002 sec. to 25 secs.
4. Number of sample values = 100 per channel.
5. Minimum sampling time = 20 sec. (inclusive of both channels).

AMCOM'S E-NET is a flexible network filing system for the BBC microcomputer, specially designed in conjunction with GSL for Education use. It uses the network interface in the BBC machine so that if you already have networked machines it only requires fitting a new ROM in each clients machine and installing the Hard Disc Unit. (If you do not have network B's then a network interface has to be fitted to each machine).

simple command program. For most schools and colleges this size disc will allow each user to have a reasonable file store, but it can be extended if required by adding further hard disc units. Important files can be easily copied to minifloppies if required.

E-NET has many useful extra commands. For example a simple command which only operates from the master (teacher's) machine, and which forces each client machine (in a certain specified room or area) to load and run

a particular program is included. This is very fast, and flexible, and allows for efficient use of C.A.L. packages. Care has been taken to ensure that the command structure is simple enough not to intimidate the non-specialist, while remaining flexible and robust.

E-NET allows one or more printers to be connected to the network and although this is connected to one of the network computers this computer can still be used even while the printer is in use.

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10. Up to 5 frequency domain plots may be stored internally and recalled for comparison with the current plot.
11. Full screens of information may be 'dumped' to a printer (NEC PC-8023B-C Dot Matrix Printer), for both the amplitude vs time and amplitude vs frequency displays.

The programme is loaded from tape using the command CHAIN "scope".

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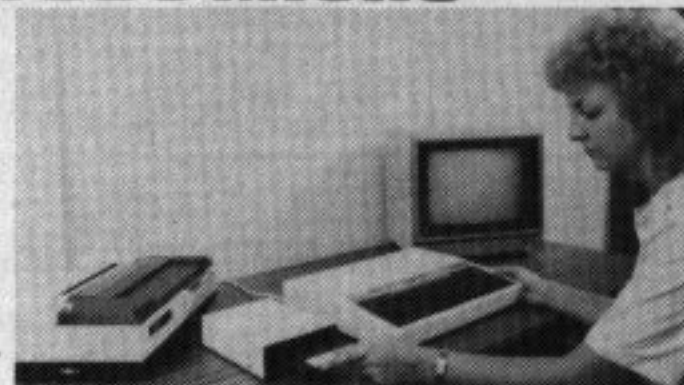
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Shugart SA200 Capacity 100K — Price £144.50 including Leads.

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Shugart SA465 Capacity 400K — Price £281.50 including Leads.
Prices excluding carriage and VAT.



The complete system is compact and easy to use.

Shugarts SA455/465 half height mini floppy disk drive offer a compact alternative to standard height drives for desk top systems requiring maximum performance in a greatly reduced space. Since users can quickly double existing storage capacity by fitting two drives in the space formerly occupied by one standard minifloppy the SA455/465 drives provided and excellent means to increase storage capacity without increasing space.

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From Page 45

same effect as Program V. In this case we define a string to print out our multi coloured character (line 50). The latter might need some explanation.

Instead of using GCOL0, 1 we can:

```
PRINT CHR$(18) + CHR$(0) + CHR$(1)
```

where CHR\$(18) is in place of GCOL

CHR\$(0) is in place of 0

and CHR\$(1) is in place of 1

So, the first four CHR\$ statements of line 60 give the foreground colour 1 (red), followed by the user defined character (224). The next three CHR\$ statements change the graphics colour

to logical colour 2 (yellow), then CHR\$(8) performs a backspace, ensuring that CHR\$(225) overprints the first character.

We use this technique in Program VII to obtain our fairy. Line 270 adds together the string *fairy\$*, consisting of its body. This is printed over *wfairy\$* which is the fairy's body plus wings (PROCfairy, 710-780).

fairy\$ and *wfairy\$* each consist of nine user defined characters, in a 3 x 3 grid. Actually, two of the characters of *fairy\$* (235 and 237) are completely blank. Since one variable overprints the other, I decided to keep the grid standard for easier handling.

Similarly, we print a filled-in ball, *fball\$*, followed by its outer rim, *uball\$*, on top of it (PROCballs, 590-690).

The candles are printed out as a combined string (*candle\$*) in PROCcandles (490-570).

The actual tree shape is drawn by printing three green triangles, the apexes of which overlap (PROCTriangles, 320-390). The base of the tree is drawn in PROCbase (410-470).

PROCmessage simply prints out a seasonal greeting, using VDU 5 to give a sort of 3D effect. Program VIII illustrates the technique.

What it does is to print out 'A WORD' in yellow several times, each time moving it down four graphic units to the left and down (line 60). This is because, each time through the loop, the number we reduce the X and Y coordinates by, I%, is increased by 4.

The reason we move four graphic units at a time is because this is the minimum resolution in Mode 1.

When you exit a loop, the loop variable is still incremented before the check to see if the loop should be terminated is made. So, when line 90 is reached, I% is four greater than when the loop last printed 'A WORD'. Also the colour has changed to red (line 100) so line 110 prints out 'A WORD' in red, one pixel down and to the left of the last 'A WORD'.

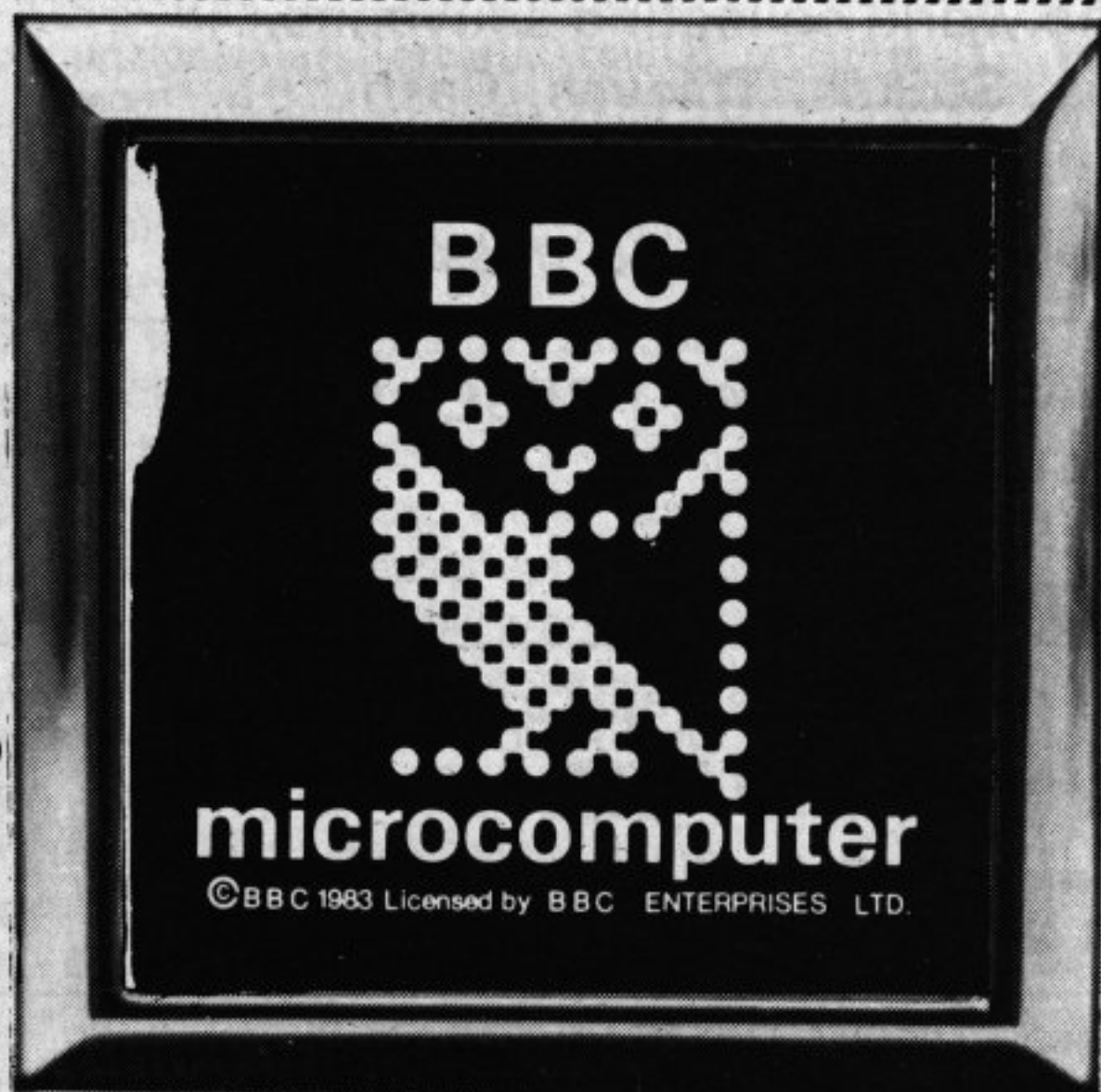
Try to decipher Program VII – working through other people's programs is one of the best ways to improve your own programming.

Next month, after this seasonal diversion, we'll return to the graphics straight and narrow with the GCOL statements I promised!

**Full listing on
Page 107**

```
10 REM *** PROGRAM VI ***
20 MODE 1
30 VDU 5
40 VDU 23,224,153,66,36,153,153,36,
66,153
50 VDU 23,225,24,0,0,153,153,0,0,24
60 character$=CHR$(18)+CHR$(0)+CHR$
(1)+CHR$(224)+CHR$(18)+CHR$(0)+CHR$(2)
+CHR$(8)+CHR$(225)
70 MOVE 640,512
80 PRINT character$
90 VDU 4
100 VDU 4
```

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Investigating what makes you tick

WHATEVER activity we are involved in, be it sitting and reading *The Micro User* or competing in a quadrathlon, our brains make sure that the body processes are maintained between fine limits.

This system of feedback, or homeostasis, involving the body organs and the brain is essential to life. At last there is a software package designed to demonstrate this vital physiology in a form intelligible to all biology students.

Physiological Simulation is an MEP subsidised biology package published by Heinemann Computers in Education. It is designed for use with pupils aged 13 and above.

The program's greatest asset is that it allows physiological investigations to occur which would not normally be within the scope of school laboratory facilities. It also allows the effect of a simple variable to be assessed in a complex physiological system.

Put simply, the user (playing the part of the brain) has to keep the body, (played by the computer) alive while performing one of a dynamic range of activities, such as running, sleeping, walking, hockey, rock-climbing and rowing.

The user begins by opting to use preset values or to input pupil details (sex, age, mass, blood volume and vital capacity), activities (already mentioned) and parameter values (breath, volume, rate of breathing and sweating rate).

Do not let the idea of measuring pupil blood volumes put you off. The detailed booklet provided has a simple-to-use nomogram which enables this variable to be quickly calculated from the subject's height and mass. Vital capacity is easily measured in class using the normal spirometer apparatus.

Once these data have been provided dynamic graphs show the person's progress over a simulated 50 minute period. A colour monitor is an advantage as the background colour changes from red to blue, while the display remains white.

Apart from a clock showing the time elapsed, graphs of oxygen debt, sugar used, oxygen supply, body temperature and water loss are all provided. A word of warning: the interpretation of the

Physiological Simulation Five Ways Software

oxygen debt graph needs clear explanation before the simulation otherwise it is very misleading.

The user must maintain all five of these variables within displayed upper and lower limits or the activity ceases and a message indicates the reason for failure, for example "Person is DEAD"!

The secret of success is to freeze the action when the body is in danger and change either the parameters or activity. Unfortunately the axes of the graphs do not show any scale or units. This facility would make the graphical display more

intelligible and bring the software up to A-Level requirements.

Once the simulation has finished it is possible to begin the program again, terminate it or display further options such as beginning a comparative simulation for a second person. After such a comparison the user can replace any one of the two sets of data and try another comparison.

The program is well "student-proofed". It is very difficult to make an error which throws the program haywire.

Clearly such a package is of most use in a teacher demonstration situation – maybe using more than one monitor if the group is large – or possibly by the more able pupil in small well-supervised groups.

Hard copy is not provided for users. This is a pity as a printout would provide a permanent study/revision piece.

A program is only as good as the mathematical model it is based on. The medical data used was mainly derived from a Swiss sample taken in 1956-57.

One cannot help but wonder how different the pupils are today when compared with those used for the present values, but the program's saving grace is that it does allow fresh data to be inserted. The source of the calculations used to plot the graphs is not disclosed – a glaring omission.

The notes for teachers are well documented on the whole and particularly useful for teachers using computer-aided learning material for the first time. It is unfortunate that no bibliography is provided to aid teachers in background/further reading.

Visual presentation in this software package is top class. The program is fun to use, but be prepared to spend an hour or two in preparation time to master its principles first. It is not an instant lesson, nor is it designed to be one, but it is a flexible and powerful educational tool which should be in every biology teacher's "toolbox".

At £12.50 – for disc or tape – this package is good value for money and recommended for use by all secondary school biologists.

Peter Hillman



Pardon my French...

Essential French Verbs for the BBC Micro (32k)

Carsondale Enterprises

THIS program covers 83 French verbs, in three main groups according to difficulty.

The choice of verbs is, of course, largely a matter of taste but I could have thought that *absoudre*, *accroître*, *croître*, *assaillir*, *dechoir* could have been omitted and replaced with many of the common *être* verbs: *sortir*, *entrer*,

monter, *retourner*, *revenir*, *devenir*, which are missing and which are essential Form Five verbs.

The second option allows one to look up the verbal forms by verb. The third option allows the user to look up by tense. The tenses covered are the present, imperfect, perfect, future and conditional – the five essential tenses.

The screen is divided into two halves. The bottom explains what is happening and the top displays the conjugation of the verbs in two “windows”. Four colours are used but black and white

can be specified. This makes them somewhat easier to see.

I had looked forward to seeing the perfect tense but I was somewhat disappointed. Not only were many *être* verbs missing but also the whole range of possible past participle endings were not displayed, nor were the *elle* and *elles* form (though there is a spare line in the window).

As the conjugation of the singular is displayed side by side with the plural, there is no room to show the *nous*, *vous* and *ils* form of reflexive verbs (except for *se taire*) and so the effect is lost. Again the participle agreements are simplified.

Could not these forms have been shown in the other window? The forms are obviously in memory because they are tested later.

The “browse” option allows the computer to display verbal forms quickly or slowly of the group of verbs and tenses chosen. The quick option displays a conjugation about once a second which is a little fast.

The fifth option is “test”. Once again, one may choose any group(s) of verbs and any of the tenses specifying a time limit if desired. The computer is very strict and does not allow extra spaces to be typed in inadvertently. Perhaps a procedure could have been used to allow this.

It is perhaps the “retest” option which is the most novel in this program. The first 10 elements of a test may be stored in memory or recalled from cassette or disc for retest, either the whole test or just the mistakes. This seems potentially useful to the learner and a 10 element test will not lose his interest.

To sum up, a sound program and a good “verb calculator” and data base. It could however, have been more explicit in the perfect tense which is a major stumbling block for the “O” Level candidate.

...and German too!

German Sentence Practice for the 32k BBC Micro

Educated Owl Software

THIS software cassette contains two programs. The first illustrates and gives the text of nine sentences or phrases and requires the learner to reproduce the sentences exactly.

The program causes the sentence to be shown on screen and requires him to reproduce the whole sentence. Praise is given when the sentence is correct. No score is kept.

The above bald description might indicate at first sight an expensive way of getting children to learn a few sentences, but this does not take into account the fact that the graphics, though simple, are extremely motivating and totally relevant to the sentences.

Many are animated, including a little man who enters a bank, and a little man who gets into a car. Four colours are used and the drawings are created on screen out of basic shapes – rectangle, triangle, circle – and this reveals the second level of the programming.

The manufacturers supply details for changing the text and for changing the graphics. The program is, in itself, a rich source of graphics procedures and means of tying text with pictures, and could prove of interest to the language teacher interested in programming or a colleague who could help him.

It is this possibility of extension that makes the program useful. Here, for

reference, is a translation of the nine phrases used. I give this because a “French Sentence Practice” cassette is also available, which would appear to have the same graphics.

The sentences are: 1, I’m shopping; 2, The handbag; 3, He has spent money; 4, He gets into the car; 5, He has to wait 30 minutes; 6, The big man who wanted to be small; 7, I ask for money; 8, Twenty marks (100 Fr in the French version); 9, He has gone into the bank.

The sentences come from the same shopping/town situation but have mixed tenses and persons – I suppose they represent important constructions, but the reason for the selection is not immediately clear though the same phrases occur in the second program.

The second program is a cloze type program. The learner is presented with a 150 word narrative about Mrs Gieselmann shopping (good “O” Level and CSE material) in the imperfect tense with 20 blank spaces to fill in. The learner is helped by being given the next letter if he fails to guess it after three attempts. A percentage score is given at the end.

Again, this program is on two levels – the text given and the fact that instructions are given on how to change the text and decide which words are to be blanked out. This tape can thus be considered a general purpose cloze-type program. In short, two programs with potential – motivating and with good use of graphics.

These reviews first appeared in the November 1983 issue of *Language Monthly*, and are reproduced by courtesy of Praetorius Ltd, 30 Clarendon Street, Nottingham NG1 5HQ.

Making sweet music

THE only criticism I have of System Software's Music Editor is its name. It should be called the Music Maker because that is exactly what it is – an easily-used utility which allows you to compose tunes on your BBC Micro.

You write the tunes using two modes of operation. The first is edit mode in which the actual composing is done. The skeleton of a piece of sheet music (technically known as the bass and treble staves) appears on the screen and you can use the keyboard to enter in a tune, note by note.

When you enter a note it not only sounds but also appears on the staves in the right position with the right value. If it's not what you want then you can just press a key to delete it and try another.

It's not just the pitch of the note you can alter. The program allows you to alter the duration and loudness of the notes, simply and quickly. You can even choose the key and tempo of your tune.

And if that's not enough you can have up to three parts or "voices" to add

harmony to your composition. It may sound complicated but in practice it isn't – the software sees to that.

The second mode is the command mode and by using this you can "command" the micro to play back your masterpiece. You can have the whole tune or just a part of it and the program even allows repeats of sections of the piece. If you like what you hear you can save it for posterity. If you don't it's back to editing mode and the throws of creation! And if you need inspiration you can always load one of your previous efforts and play it.

As if all this weren't enough, when

you first run the Music Editor you get a choice of 16 ready-to-use sound envelopes. If you don't like these you can alter them easily from the keyboard or load envelopes that you have previously altered and saved.

These are just the major facilities that the program gives you. There are lots more, all useful. And if you get lost you can always press the H key and get a crib sheet.

But you shouldn't need it. The instruction booklet is excellent and the whole program an example of what is meant by "user-friendly". People with no musical knowledge may be a little daunted at first but the Music Editor is so easy to use that it encourages experiment and with it learning.

You can write tunes by ear while the display gives you the correct musical notation. It's a gift to every frustrated composer, thwarted music teacher and parent who wants to give a child something that is amusing yet educational. And it's so much fun to use!

This excellent piece of software was a pleasure to review. Thoroughly recommended.

Nigel Peters

Physically, it's a bit of a weakling

ON loading this attractively illustrated program my first impression was one of disappointment.

As it comes from one of the more promising software producers, I had hoped for a lively and imaginative guide to physics formulae and effects.

But if you're looking for attractive graphics or even some vague degree of user-friendliness, this program offers little satisfaction.

If, however, you want a plain and simple testing-of-formulae program, Physics will probably suit you.

The program is menu driven, and offers eight options: Test, List, Formulae, Instructions, Load Data, Save Data, Add Data, and End.

With the Test option, you are given 10 questions such as:

The power is 4.3W
The current is 6.9A
What is the voltage?
Units?

You have to enter the answer and the correct abbreviation for the units. If you get the answer wrong, then in the above example, the response is "Wrong, $4.3/6.9 = 0.623188406$. The units of voltage are V".

Your score at each stage is displayed, and after the 10 questions it is also given as a percentage.

The full list of quantities and units is given by the List option, and consists of 28 quantities beginning with mass, density, volume and ending with resistivity, length, temperature, sine and cosine, tangent and capacitance.

The list thus covers a reasonable range of basic equations, with all the units given in the SI convention.

The Formulae option is useful for revision and allows you to enter a subject, such as "work". It then displays all the formulae relevant to that subject, in this case:

Work = voltage x charge
Work = power x time
Work = force x distance
Work = temperature x mass

If you read the section on Add Data in the instructions, this is what you see:

"You may add extra data by keying in your formulae (quantities in lower case) in the addition section. This data may then be saved and loaded from tape".

However, I find this feature very confusing and have still not managed to work out how to use it.

Presumably it lets you expand the subject range to include more varied equations and to load these as and when you need them.

This program could conceivably find a useful place in schools or for a revision aid at home for those unfortunate enough to need to recall a wide range of equations with ease.

But, sadly, it lacks the user-friendly approach which must surely be a priority for all educational software, and though probably an effective learning aid, it makes no attempt to use the BBC Micro's colour, sound or graphic facilities in any way.

Jane Jackson

Sprite-gen

DACC

HOW many times have you had a good idea for a game but found that moving large numbers of objects around the screen has slowed everything down so much that the whole thing is pointless? Well, what you obviously need are some sprites.

Sprites are picture elements that can be made to move around the screen. They are normally generated with the aid of hardware but can also be formed and moved by software. The Sprite-gen program allows you to do just that in a painless manner.

The cassette contains the sprite generator program and two example games that use ready-defined sprites. Both games are listed in the 13-page

PHOENIX RISES YET AGAIN

Firehawks

Postern

FIREHAWKS is yet another version of Galaxians, the old arcade game. A bunch of ravenous energy-consuming Firehawks drop from the top of the screen. They are trying to get to the bottom where they will regenerate into the legendary Phoenix. As they dive they're delayed by a series of plasma fields through which they have to weave their way.

Once past these there is only your spaceship's laser canon to hold them off. This is easier said than done as there are some 225 levels of difficulty – how anyone can play the higher levels defeats me. Yet I've seen it done!

While the noises it makes are the loudest I've ever heard on the BBC Micro, the graphics aren't all that impressive and the game itself appears simple and fairly standard at first. Not much to write home about you might think.

Then you see someone playing it and immediately want to have a go, convinced that you can do better. It can get quite compulsive and, at the higher levels, exasperating. It may be simple but it's fun. So, if you want a fast, action-packed version of an old arcade favourite then this will probably meet your needs.

Eileen Young

Genned-up on sprites

manual and I was impressed that such effective games can be written in so few statements.

The sprite generator itself is easy to use. Sprites are defined on a 7×8 grid and because the program uses mode 2 any of the BBC Micro's 16 colours may be used. Larger objects can be defined by linking a number of sprites in the user program.

There are 32 sprites available although numbers 0 to 7 are the main ones. The rest are known as clones. A clone normally takes on the design of its associated sprite although this can be altered.

An added degree of animation can be included by careful use of the flashing colours. The example called Chopper Chase shows this admirably.

Any sprite can be simply placed in any position by a line of Basic. It is positioned by use of integer variables assigned to that particular sprite. For example, sprite 0 is allocated A% and B%. Thus to position sprite 0 at

(640,512) you just key in:

100 A%=640:B%=512:

Z%=0:CALL &10A3

Z% contains the sprite number and the CALL merely invokes the machine code that displays the sprite. If A% or B% is updated and sprite 0 displayed again then the old image is deleted automatically. A nice addition is that by adding 256 to the sprite number that sprite is removed from the screen.

On defining a sprite two images are created, allowing smooth movement. The second image can, however, be defined to differ from the first allowing another level of animation.

Sprite-gen is a very useful utility. The examples are good to look at and fun to play. DACC have even more impressive demonstrations so it's very versatile. A minor omission is that it doesn't include a facility to detect when one sprite hits another. But that is a minor flaw in an otherwise impressive package.

Alan Plume

Feeling a bit peckish?

Snapper

Acornsoft

SNAPPER is an attractive and incredibly frustrating version of Pacman. You have to guide a cute little yellow Snapper (complete with green hat) through the maze, gobbling dots and juicy looking cherries, strawberries and other fruits as you go.

The creatures who lurk in the cave in the centre of the maze are unfortunately trying to gobble you and, if they don't manage to corner you between them, one look at their enormous bulging eyes may well scare you rigid anyway.

Just so as not to make it too one-sided, if you eat any of the four flashing dots in the corners, you get 10 seconds in which to get your own back, and earn some bonus points as well, while the creatures are temporarily harmless.

When all the dots are eaten you tackle a new screenful. The game gets progressively faster and the value of the fruit also increases.

If you can make it to 15,000 points you earn another Snapper, and if you can get through 12 screenfuls you may get a glimpse of the ultimate prize – the Acorn.

You can play Snapper with the keyboard or with joysticks and both are good, with perhaps the joystick giving you the nearest feeling to the arcade versions.

A high-score table is included and the accompanying sound effects are very authentic.

Altogether, Snapper is one of the best versions of the game that I've seen. It's relatively easy to pick up the controls and to get fairly proficient at dot gobbling – but it's almost impossible to win.

Jane Jackson

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BMU12/83



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THE GHOSTS at the Tower of London have left their usual haunts. They've taken the treasures from the vaults and scattered them all over Tower Bridge.

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The trouble is that the ghosts, while not harmful, are mischievous. If one catches you while you're on your way to

the bank with some treasure, it will probably take it off you and put it back on Tower Bridge. And the bridge is opening and closing all the time.

Just to make it more frustrating, as soon as you've collected all the treasures and put them in the bank the ghosts scatter them all over the bridge again.

And this time there are more of them trying to thwart you!

Major Procedures

- 1330 **PROCinit** dimensions and sets up arrays used in program; also sets up user-defined characters and sound envelopes.
- 1500 **PROCsetup** sets up variables at start of each sheet.
- 940 **PROCscreen** sets up screen, as you might guess.
- 900 **PROCbridge** draws bridge.
- 650 **PROCman** animates man.
- 750 **PROCguard** animates each guardian ghost.
- 860 **PROCraise** raises/lowers bridge.
- 510 **PROCmanmove** reads keyboard and decides where to put man.
- 630 **PROCfall** moves falling man and finds out if he is in Thames.
- 700 **PROCthink** decides where to put ghosts.
- 1000 **PROCTower** draws towers.
- 1130 **PROChead** displays the title header.
- 1250 **PROCTell** displays instructions.
- 1560 **PROCerr** traps escape or displays any other errors.

Major Variables

- A% = TRUE if man is dead.
- C% = TRUE if man carrying treasure.
- D% = TRUE if ghouls carrying treasure.
- K% = Ascii value of key pressed.
- M% = Number of lives left.
- N% = Number of ghost being animated.
- S% = Score to date.
- T% = Number of treasures in bank.
- U% = Height of bridge.
- X% = Man's X co-ordinate.
- Y% = Man's Y co-ordinate.
- hi% = High score.
- nc% = New character for man.
- oc% = Old character for man.
- no% = Level (number of ghosts).
- up% = TRUE if bridge to be raised.
- X%(N%) = X co-ordinate of ghost N%
- Y%(N%) = Y co-ordinate of ghost N%

**Complete listing
starts on Page 127**

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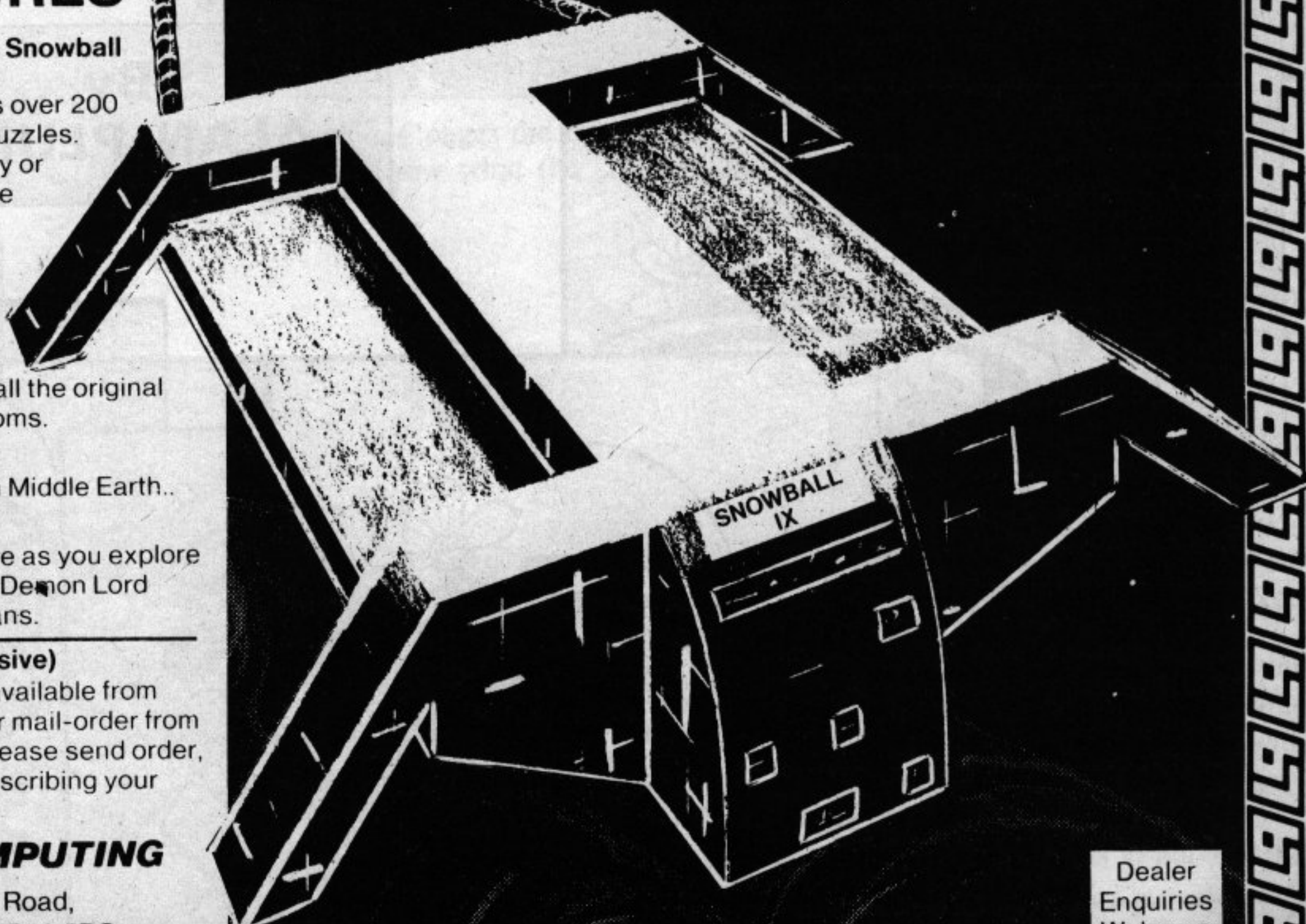
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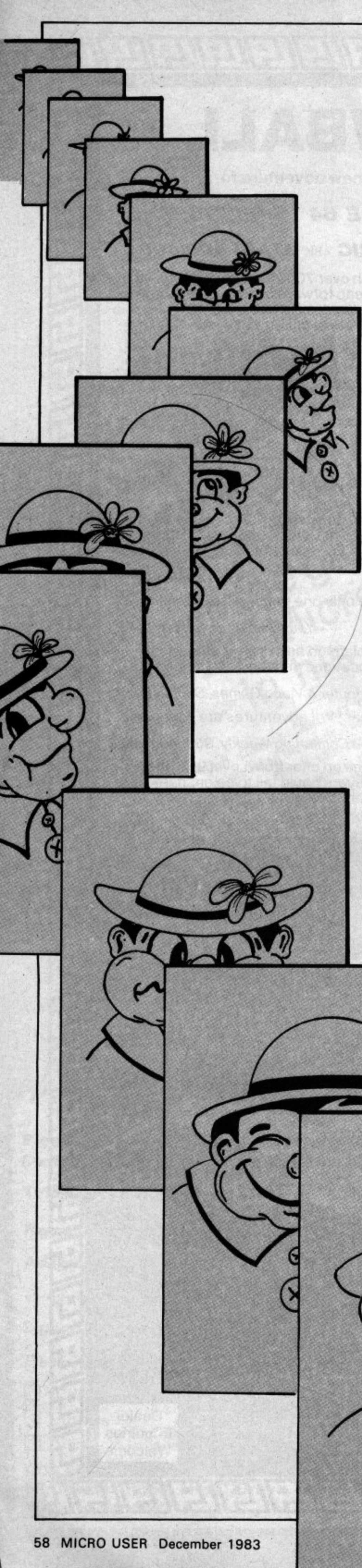
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Welcome



AT the heart of the BBC Micro's graphics capability is a remarkable device called a 6845 cathode ray tube controller (CRTC). This device not only controls how the display memory is organised to give a picture on your television or monitor, but is also constantly refreshing the machine's RAM.

The 6845 has 18 registers, but this article is concerned with only two of them, R12 and R13.

These registers are "write only" and hold a 14 bit address which supplies the start address of the current display memory.

In modes 0 to 6 this value is the start address of the screen memory divided by eight. Thus in mode 4 the registers contain:

```
R12 (MSB) = ( &5800 DIV 8) DIV 256  
R13 (LSB) = ( &5800 DIV 8) MOD 256
```

New values can be written to these registers by using the VDU 23 statement:

```
VDU 23;12,hibyte;0;0;0  
VDU 23;13,lobyte;0;0;0
```

It doesn't take a lot of imagination to realise that writing other values to these registers could generate useful effects.

Here are three major uses, and I'm sure that there are many more:

- To allow fairly smooth animation of complex shapes.
- Fast sideways and up/down scrolling. Anyone who has played Rocket Raid knows how effective sideways scrolling is.
- Displaying a micro slideshow with stored frames of text or graphics on disc. While one frame is on display another can be loaded into a spare section of memory and then switched in

Use these pages to get your images moving

By
ALAN PLUME

by changing R12 and R13.

Obviously only modes 4 to 7 can be used for this, as the computer doesn't have enough RAM to support two mode 1 screens.

This is how we use these techniques for animation.

The original drawing is made in the normal memory for the appropriate mode.

While on display some pointers in the memory are altered and the next frame is actually drawn in another section of memory.

The address of the top of the new memory is written to R12 and R13 and the new frame seen. The old frame is deleted and the next frame constructed. This is then switched in. The process can be continued indefinitely.

Now let's see how all this is accomplished.

For this example mode 4 will be used. Normally the mode 4 screen uses memory locations &5800 to &7FFF, so if we use another page then that can be from &3000 to &57FF.

HIMEM must thus be established at &2FFF so that the program workspace doesn't overwrite the second page.

We also need to be able to clear both graphics pages quickly so we use a dedicated piece of assembler to do this. It's not too elegant, but works fast enough. Either page can be cleared by altering a single byte of the code.

Next we need to calculate the values

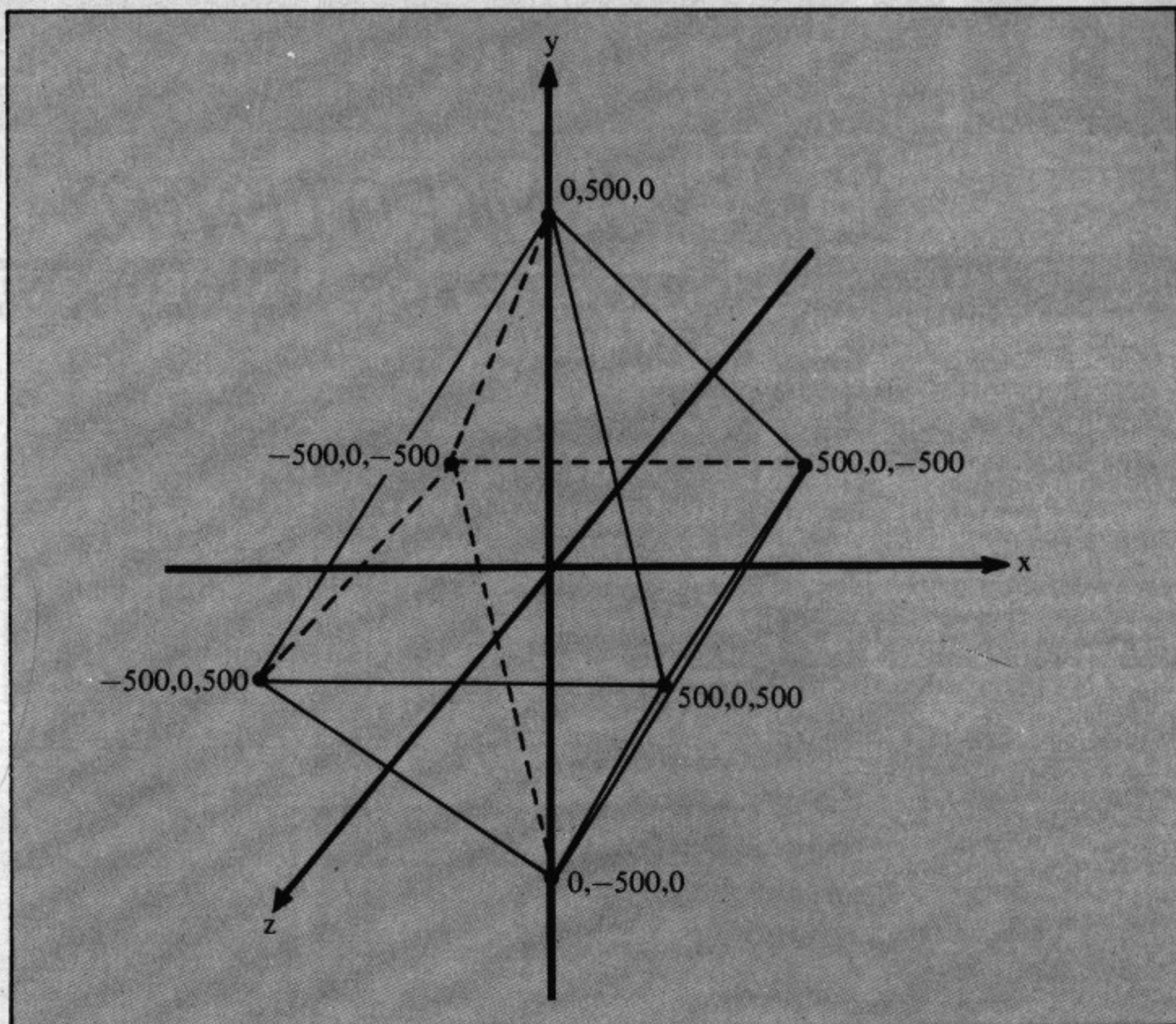


Figure 1

of registers 12 and 13 of the 6845 to allow page changes. If we consider the area from &5800 to be page 1 and that from &3000 to be page 2 then we have:

```
R12 = (&5800 DIV 8) DIV 256 = 11
R13 = (&5800 DIV 8) MOD 256 = 0
R12 = (&3000 DIV 8) DIV 256 = 6
R13 = (&3000 DIV 8) MOD 256 = 0
```

When switching pages the operating system has to know what the current

high byte of the screen start is.

This value is stored in the VDU workspace at &34E. Thus for page 2 we need to add:

```
?&34E=&30
```

and on switching back to page 1:

```
?&34E=&58
```

Now how do we tell the operating system that we want to draw on page 2?

Locations &350 and &351 appear to contain the base address that the plotting and printing routines use to place information on the screen, so we also need:

```
Page1 ?&350=0: ?&351=&58
Page2 ?&350=0: ?&351=&30
```

All this poking around in memory is exactly what Acorn tell you not to do, but if you want special effects you often have to do this.

Program I is an example of this technique used to display a wireframe cube rotating about two axes with perspective.

The program is written to allow you to put your own objects in fairly easily

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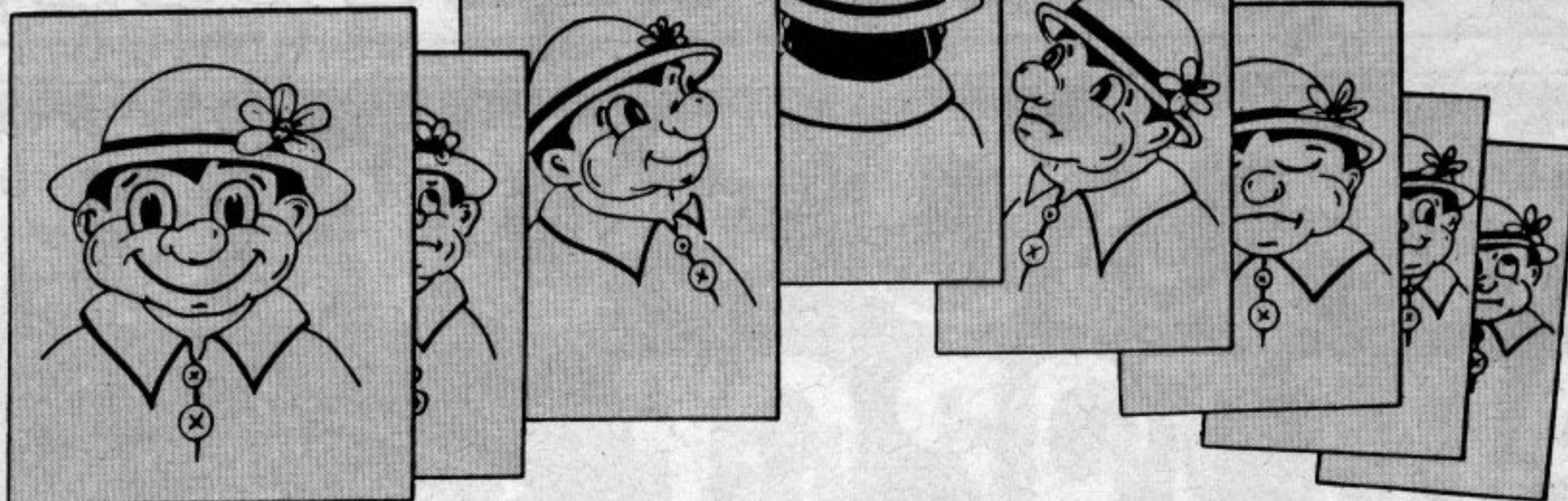
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B12



From Page 59

by altering the DATA statements at lines 3000 and 3010.

The first set of data contains the number of points defining the object and its x, y and z co-ordinates. The second data set contains the number of lines and the linkages for these lines.

To illustrate this is a diagram of a three dimension diamond shape and the

associated data statements. (Note that the z-axis is the axis coming out of the screen.)

```
3000 DATA 6, -500, 0, 500, -500, 0,
-500, 500, 0, -500, 500, 0, 500, 0,
500, 0, 0, -500, 0
3010 DATA 12, 1, 2, 2, 3, 3, 4, 4, 1,
1, 5, 2, 5, 3, 5, 4, 5, 1, 6, 2, 6, 3,
6, 4, 6
```

The rotation procedure at lines 1500 to 1520 is also designed to allow the user to alter the axes of rotation, and even the angles of rotation. The parameters A11 to A33 are initialised in PROCsetup. As an example, to rotate about the z-axis only:

```
1620 A11=C:A21=S:A31=0
1625 A12=-S:A22=C:A32=0
1630 A13=0:A23=0:A33=1
```

```
10 MODE 4
20 HIMEM =%2FFF
60 VDU 29,640;512;23;8202;0;0;0;
70 *FX4,1
80 PROCass
90 PROCots
100 PROClines
110 PROCsetup
150 REPEAT
160 PROClwod
170 PROClpage1
190 PROCrotall
200 PROClwod
210 PROClpage2
220 PROCrotall
230 UNTIL FALSE
680 DEF PROClwod
690 REM Convert to 2D coords.
700 FOR CX=1 TO P%
710 D=2500/(DX-Z(CX))
720 UX(CX)=X(CX)*D
730 VX(CX)=Y(CX)*D
740 NEXT
750 ENDPROC
760 DEF PROClpage1
770 ?%34E=%58
    :?%350=0
    :?%351=%58
780 PROCdraw
830 VDU 23;12,11;0;0;0;23;13,0;0;0;0;
840 ?(repeat+2)=%30
    :CALL clg
850 ENDPROC
1210 DEF PROClpage2
1220 ?%34E=%30
    :?%350=0
    :?%351=%30
1240 PROCdraw
1260 VDU 23;12,6;0;0;0;23;13,0;0;0;0;

1270 ?(repeat+2)=%58
    :CALL clg
1280 ENDPROC
1500 DEF PROCrotall
1501 FOR CX=1 TO P%
1505 X=X(CX)
    :Y=Y(CX)
    :Z=Z(CX)
1510 X(CX)=X*A11+Y*A12+Z*A13
1512 Y(CX)=X*A21+Y*A22+Z*A23
1515 Z(CX)=X*A31+Y*A32+Z*A33
1517 NEXT
1520 ENDPROC
1550 DEF PROCdraw
1555 FOR CX=1 TO L%
1560 J%=SX(CX)
    :KX=EX(CX)
1565 MOVE UX(J%),VX(J%)
1570 DRAW UX(K%),VX(K%)
1580 NEXT
1590 ENDPROC
1600 DEF PROCsetup
1605 DX=5000
1610 A=PI /30
1615 C=COS (A)
    :S=SIN (A)
1620 A11=C*C
    :A21=S*C
    :A31=-S
1625 A12=-S
    :A22=C
    :A32=0
1630 A13=A21
    :A23=S*S
    :A33=C
1635 ENDPROC
1700 DEF PROCass
1705 REM Assemble clear graphics
    code.
1710 DIM P% 30
1720 OPT 2
1725 .clg LDA#0
1730 LDX#0
1740 LDY#40
1745 .repeat STA%5800,X
1750 INX
1755 BNE repeat
1760 INC repeat+2
1765 DEY
1770 BNE repeat
1775 RTS
1780 J
1785 ENDPROC
1800 DEF PROCpts
1805 REM Read in points data.
1810 READ P%
1815 DIM X(P%),Y(P%),Z(P%),UX(P%),
    VX(P%)
1820 FOR CX=1 TO P%
1825 READ X(CX),Y(CX),Z(CX)
1830 NEXT
1835 ENDPROC
2000 DEF PROClines
2005 REM Read in lines data.
2010 READ L%
2015 DIM SX(L%),EX(L%)
2020 FOR CX=1 TO L%
2025 READ SX(CX),EX(CX)
2030 NEXT
2035 ENDPROC
3000 DATA 8,-500,500,500,500,500
    ,500,500,-500,500,-500,-500
    ,500,-500,500,-500,500,500,-500
    ,500,-500,-500,-500,-500,-500
3010 DATA 12,1,2,2,3,3,4,4,1,1,5
    ,2,6,3,7,4,8,5,6,6,7,7,8,8,5
```


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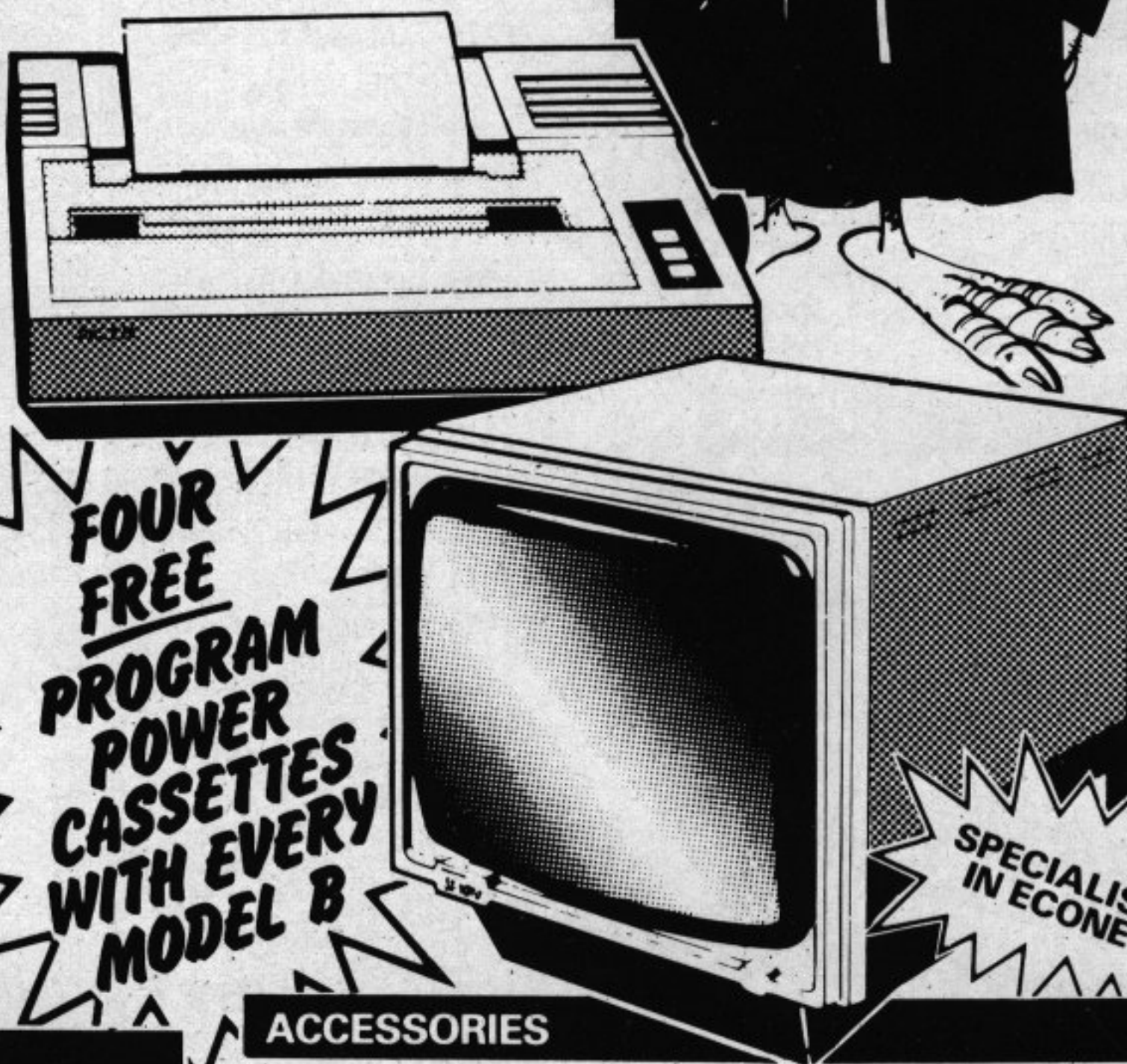
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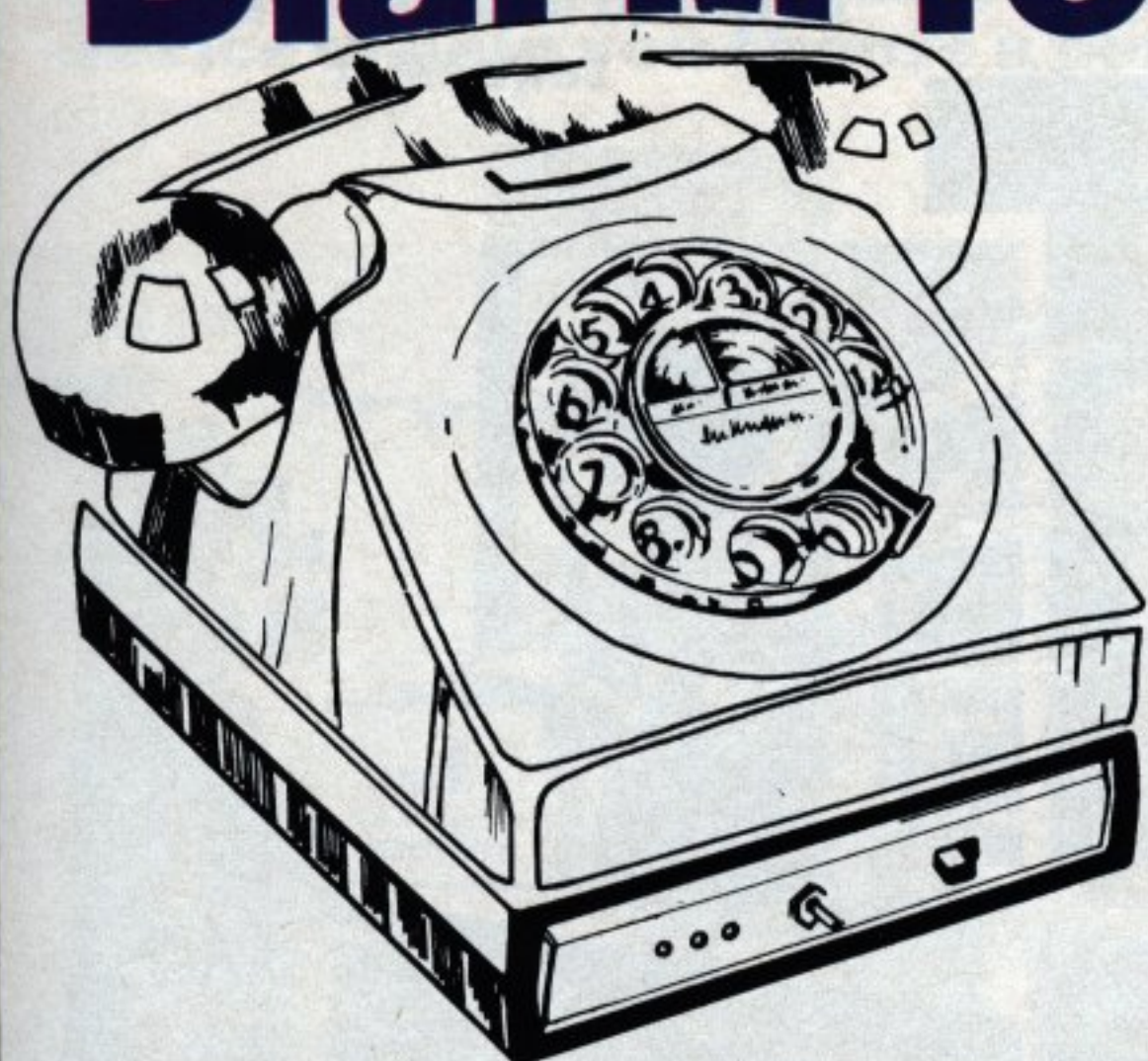
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lapel badges in one Sheffield computer shop. We're sure that our readers can come up with something more original.

So that's this month's competition. We want you to tell us what you consider to be the best use for an old 0.1 ROM – in not more than 25 words.

The most original, entertaining (and

printable) entries will be the winners.

Since it's the festive season, the prize this month is not one, but three complete Micronet kits.

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TWO *Micro User* competition results this month.

● Winner of the PL Digitiser contest in our August issue was Mr S. Valentine, of Sale, Cheshire.

OUR pub echoes the sounds of battle; Space Invaders are here. This electronic game panders to man's survival instincts; destroy or be destroyed.

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● The September prize, a Hobbit floppy tape system, was won by Mr I.M. Rhodes, of Pulsborough, Sussex. His winning entry, a description of Space Invaders, is published below.

can repulse them and "shoot" astronomical scores. Exhilarating! Addictive! Out of this world! This push button warfare is a sure fire winner.

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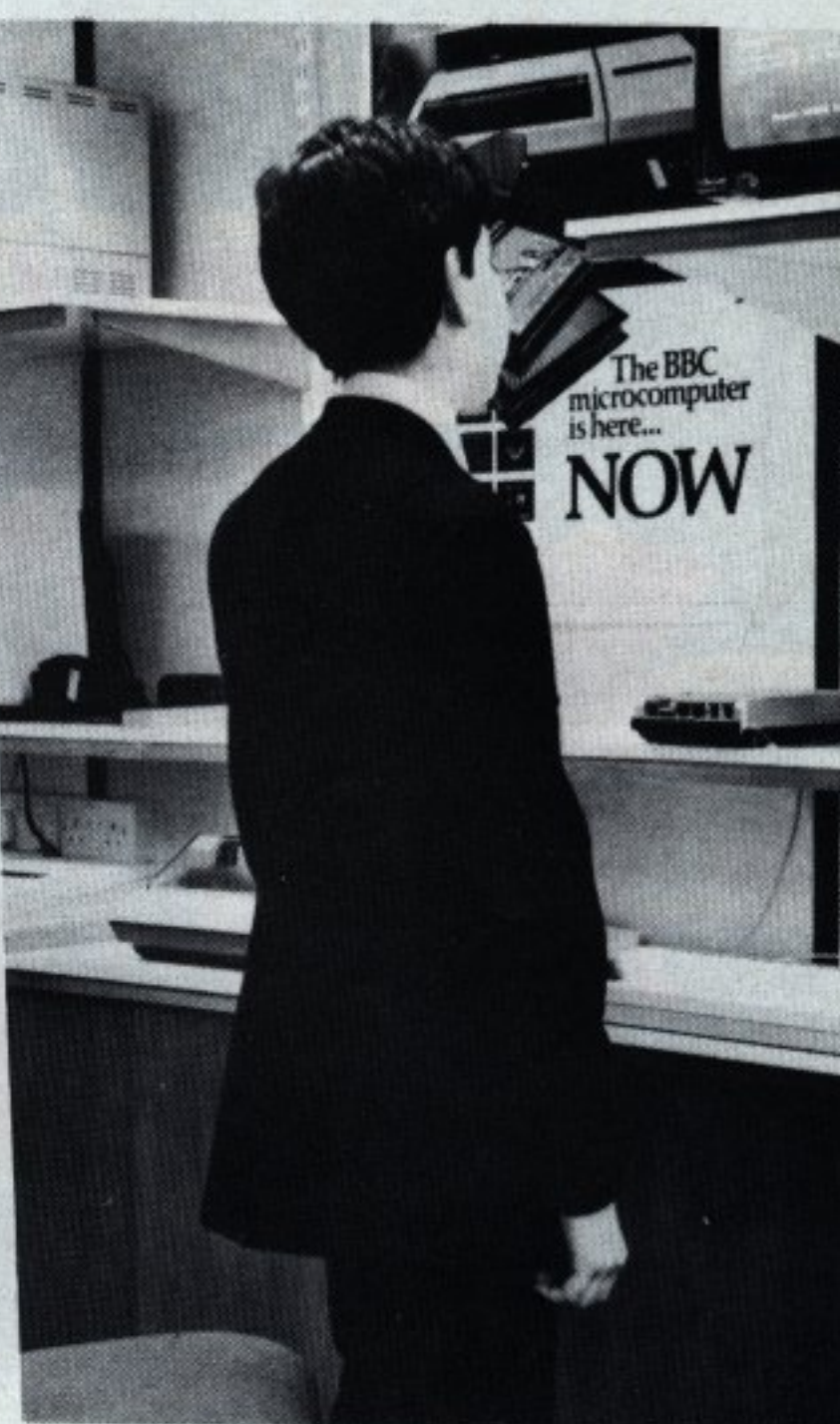
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Features include fast smooth multi-coloured characters, 8 types of component, 4 types of tools, increasingly difficult track patterns, multiple firing, interrupt driven graphics, sound effects, high scores, bonus etc.

HEIST by Marcus Altman

"Look out investors your local bank is being robbed!" Manoeuvre the bank manager around the building, collecting money bags and returning them to the vault - Dodge the ever chasing robbers or bop them on the head with a hammer. Beware of the time bomb which you must defuse or you will sprout wings and fly to heaven.

Enjoy a refreshing cup of tea for bonus points, game increases with difficulty on each level. Features include fast smooth multicoloured characters, excellent sound effects, background music. Very addictive and fun.

HEIST



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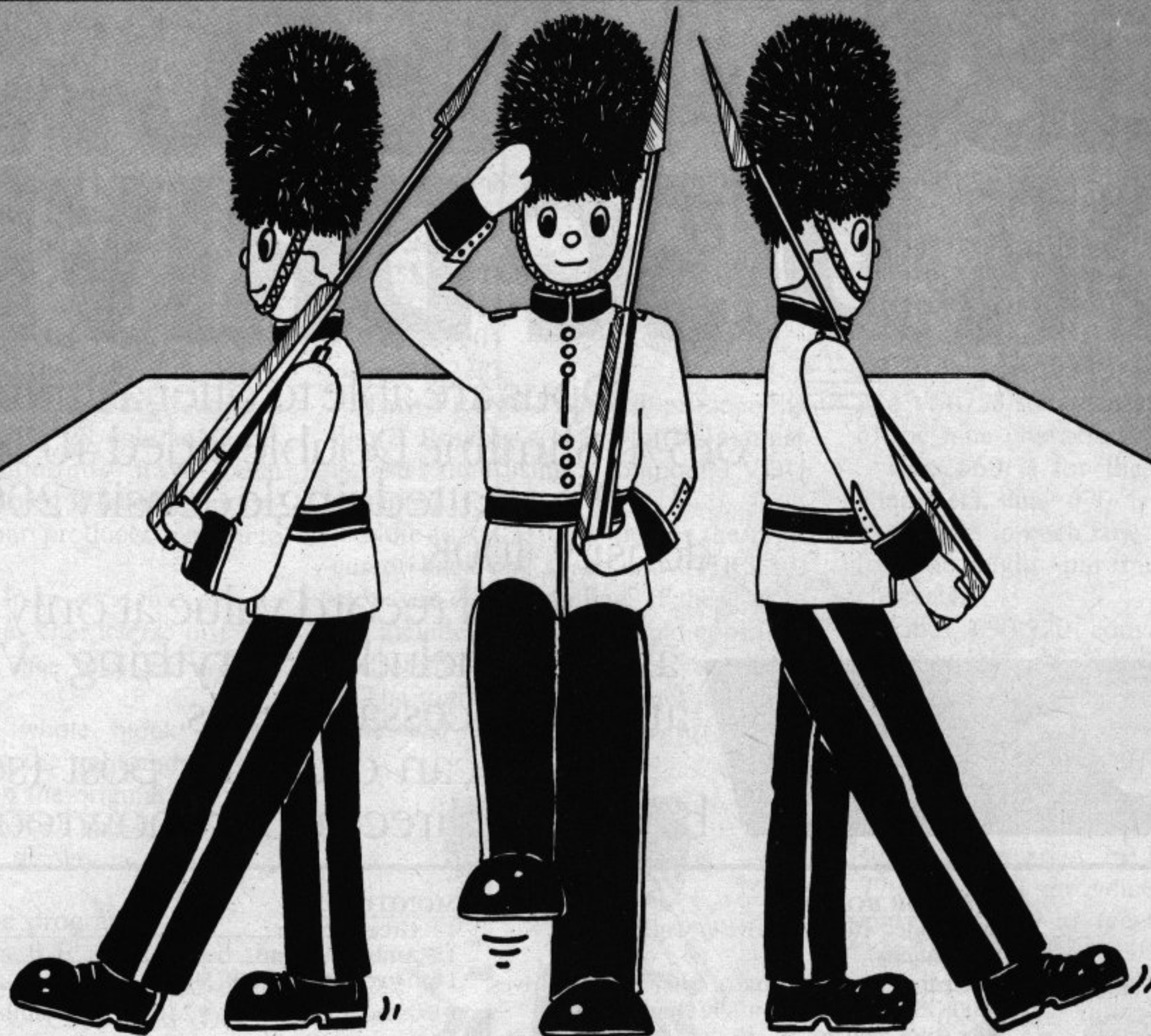
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2. Rotate left.
3. Mirror image (left to right).

There is no limit to how many times each may be carried out, so a great variety of orientations is available. For example, a double rotation right or left will give an inversion.

The characters displayed may be edited at any time, so if the characters are defined and rotated and a change is required in the new orientation, it can be easily carried out and the com-

mands for the new shape will be produced.

The mirror image facility is particularly useful. If characters are drawn to create a man walking from left to right the computer will give the commands needed. Then by using the

**By
MICHAEL
MURRAY**

mirror image, the commands needed to walk in the opposite direction will be produced with no additional effort.

Similarly, the commands to make him walk up the side of the screen may be produced using rotate and mirror image.

When the program is run the user will be presented with a grid representing 3x3 characters, sub-divided into the individual pixels. A cursor will appear in the top left hand pixel, and this may be moved anywhere in the grid using

the cursor control keys.

When the cursor is at the correct position the pixel may be set by pressing COPY. To draw a continuous line the COPY key can be held down while the cursor keys are operated.

A diagonal line may be drawn by using two cursor keys at the same time. Any pixel may be unset by moving the cursor to it and pressing Delete. Lines may be deleted by holding the Delete key down while operating the cursor keys.

It is not necessary to use all the characters available, only as many or as few as are wanted. When the characters are completed to the user's satisfaction pressing Return will cause the cursor to disappear.

After a short pause, during which the computer is doing its calculations, the commands that have been used to produce the characters that have been drawn will appear, each character

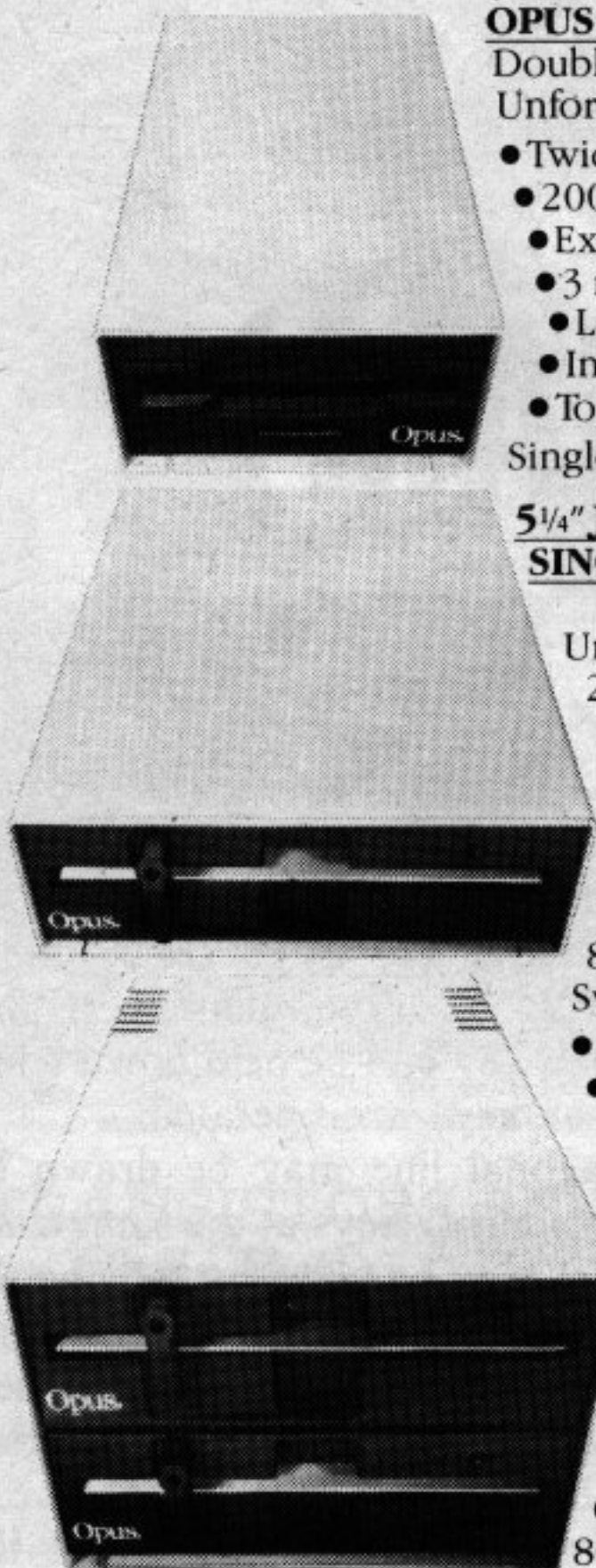
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From Page 67

being drawn alongside the relevant command.

At the bottom of the screen the whole block will be printed in two forms. The first is the form of the block in 40 column mode and the second is as it will appear in 20 column mode. After the commands have been examined, and noted if required, pressing the Space bar produces a menu to allow:

- Start again from scratch.
- Re-draw the characters just defined (in case changes are wanted)
- Rotate the whole block of characters to the right and display them on the original grid.
- Rotate to the left and display.
- Create and display a mirror image.
- Exit from the program.

When options B-E are selected the resulting display may be edited using the cursor keys, Copy and Delete. Pressing Return will then produce the commands for the amended display.

If options C-E are selected pressing Return without editing will produce the commands for the original characters in the new orientation.

The redefinable characters used in this program are 224-232, as shown in Figure I, but there is no reason why these need to be used.

| | | |
|-----|-----|-----|
| 224 | 225 | 226 |
| 227 | 228 | 229 |
| 230 | 231 | 232 |

Figure I

It is the parameters which follow that are important, and these may be used in a VDU23 statement to redefine any character required by the user to give the shape that he has drawn.

If the whole block is to be treated as a single figure it may be printed as a compound VDU statement, for example:

```
VDU224, 225, 226, 8, 8, 8, 10,
227, 228, 229, 8, 8, 8, 10, 230,
231, 232
```

This is demonstrated in line 900 of the listing. However if this is to be done frequently it is better to assign the whole figure to a string.

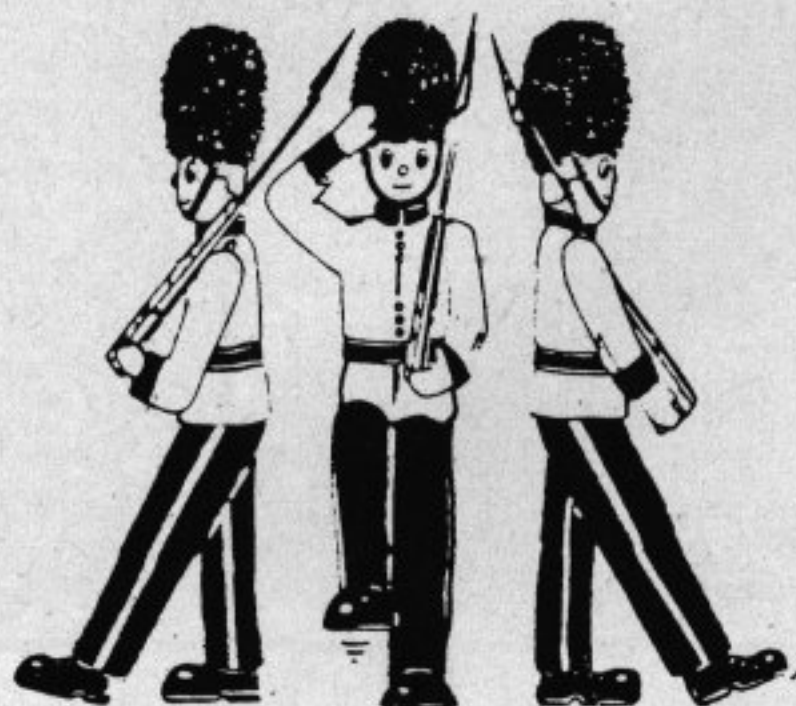
For example, if a figure has been drawn using the four top left hand characters:

```
FIG$=CHR$(224) + CHR$(225)
+ CHR$(8) + CHR$(8) +
CHR$(10) + CHR$(227) +
CHR$(228)
```

Thus PRINT FIG\$ will produce the figure. Printing a string in this manner is faster than using a compound VDU statement.

Note that CHR\$(8) moves the print cursor back one space and CHR\$(10) moves it down one line. If these were not included the figure would appear in a straight line.

The main program is lines 130-200. Line 150 dimensions the array into



which the parameters for each character are to be placed, that is characters 0-8, parameters 0-7.

Lines 160-180 draw the initial figure and produce the commands while line 190 enables repeated changes and manipulations to be made.

PROCGRID draws the basic grid. Each grid square is 40x40, so that when a pixel is filled with a 32x32 character the grid lines are preserved.

Line 260 is to print the lines representing character positions in white and those representing pixels in red.

Line 340 defines the cursor and 350 the pixel filler character.

PROCDRAW is the procedure to draw the characters. Lines 420-430 place the cursor in the top left of the grid. Lines 440-580 control drawing until Return is pressed.

Line 450 is a time delay that can be altered to suit the user. Line 460 stores the current cursor position. Lines 470-500 calculate the new position according to which cursor keys are being pressed, and lines 510-520 keep the cursor within the grid.

Line 530 deletes the cursor from its old position. Lines 540 and 570 draw it in the new position.

Line 550 deletes any pixel in the new

position if Delete is pressed, while line 560 sets the pixel if Copy is pressed.

Line 590 removes the cursor after Return has been pressed.

PROCCOMMANDS examines the grid to determine which pixels are set and calculates the parameters required in a VDU23 statement to produce each of the nine characters.

Line 660 is for the three rows of characters, line 670 is for the three characters in each row and line 680 is for the eight parameters in each character.

Lines 690-720 convert the binary representation of each character into a number, the left hand pixel of each row of each character being worth 2^7 , decreasing to 2^0 for the rightmost pixel.

As each parameter is calculated it is stored in an array by line 730. Lines 770-790 read the values in the array and use them to redefine characters 224-232.

Lines 800-870 print the commands used to define the characters and display the characters thus defined immediately afterwards.

Lines 890-900 display the 3x3 block of characters at the bottom of the screen while line 910 calls a procedure that simulates the appearance of the block in 20 column modes.

Line 920 holds up the program until the SPACE bar is pressed.

PROCMODES extends the horizontal scale of each character by two to simulate its appearance in the 20 column modes.

PROCROTATE_R reads the array of parameters and manipulates it to produce a display rotated to the right. Lines 1220-1230 determine the start point for each character, and 1240-1250 the start of each row (represented by one parameter) within the character.

Lines 1260-1280 convert the value of each parameter into a binary representation and sets the pixels in the grid to show this. Due to the rotation they will be set top to bottom instead of left to right.

PROC MIRROR and PROCROTATE_L are similar to PROCROTATE_R, but with slightly different manipulations of the parameters to give a mirror image and a rotation to the left respectively.

PROCCHOICE is a simple menu selection routine to allow the user to choose his next option and execute it.

**Listing starts
on Page 112**



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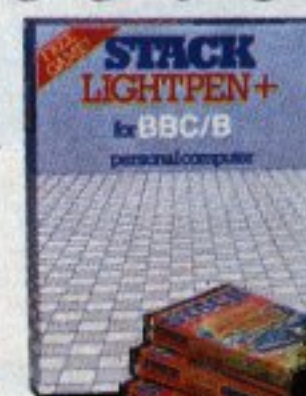
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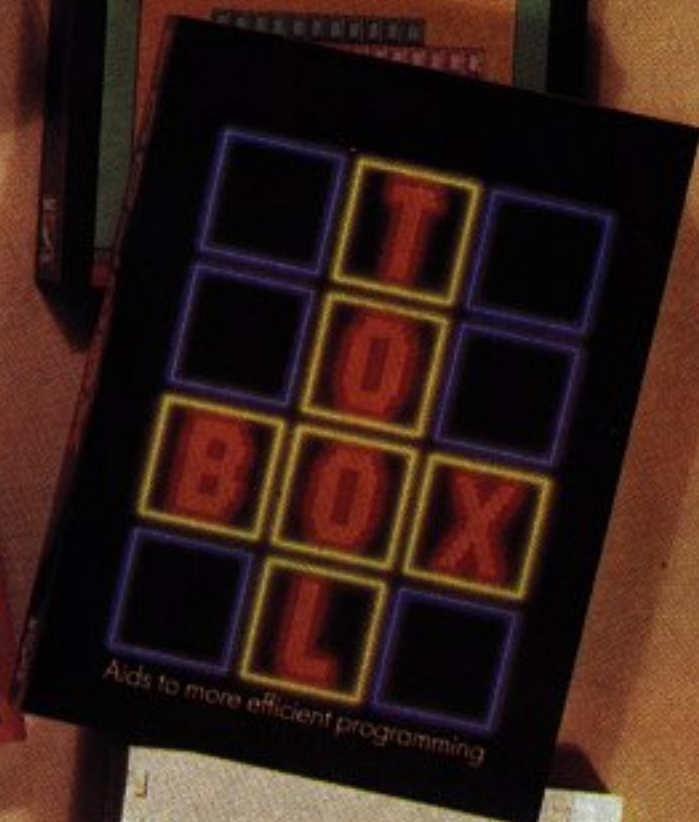
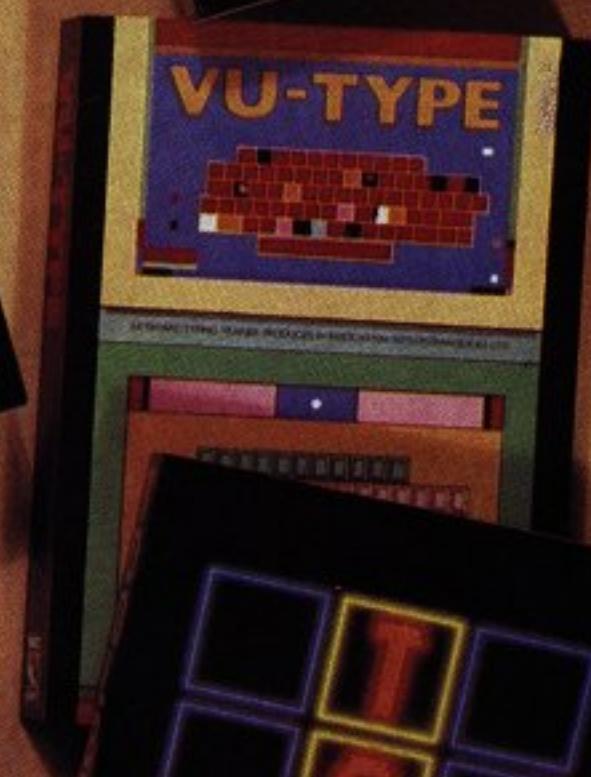
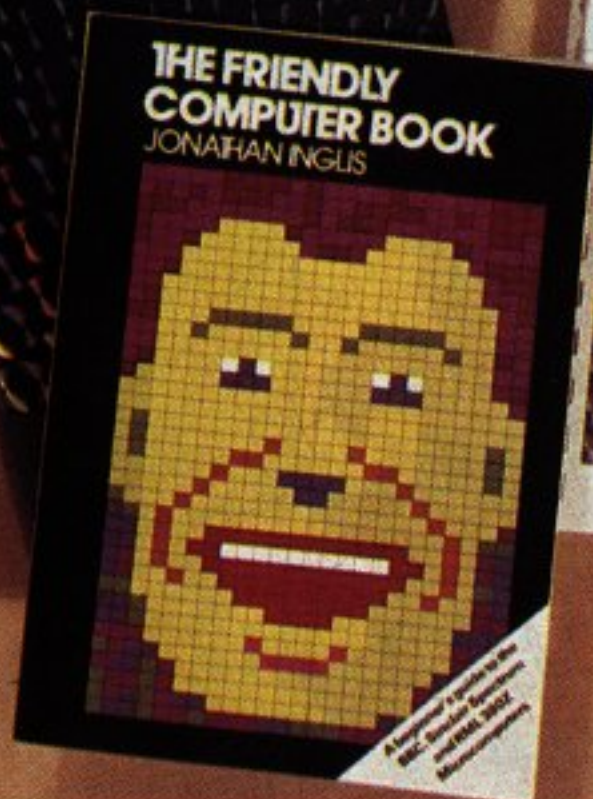
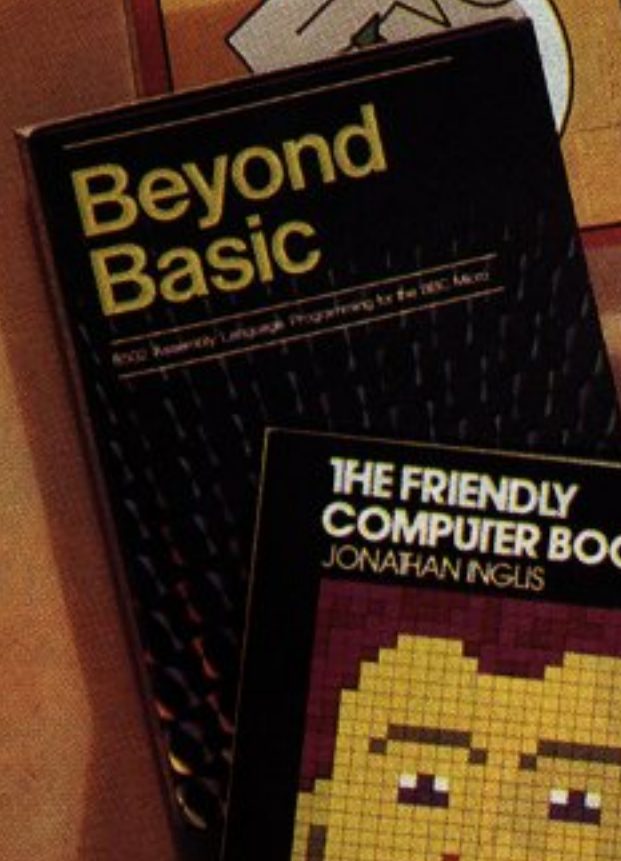
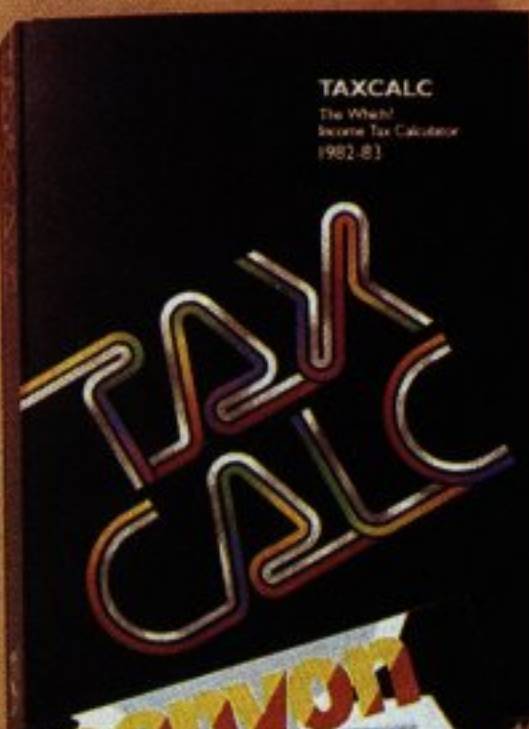


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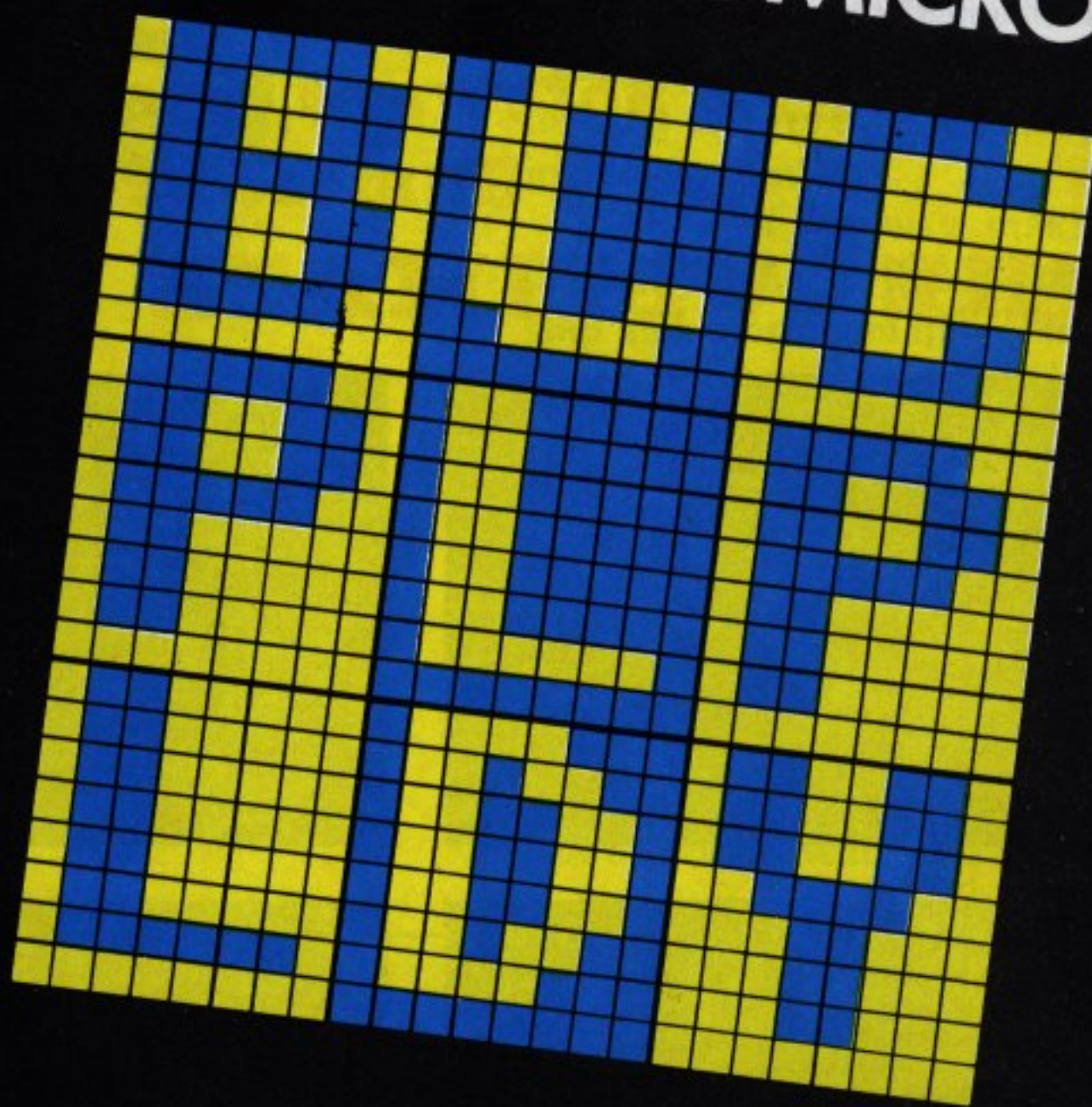
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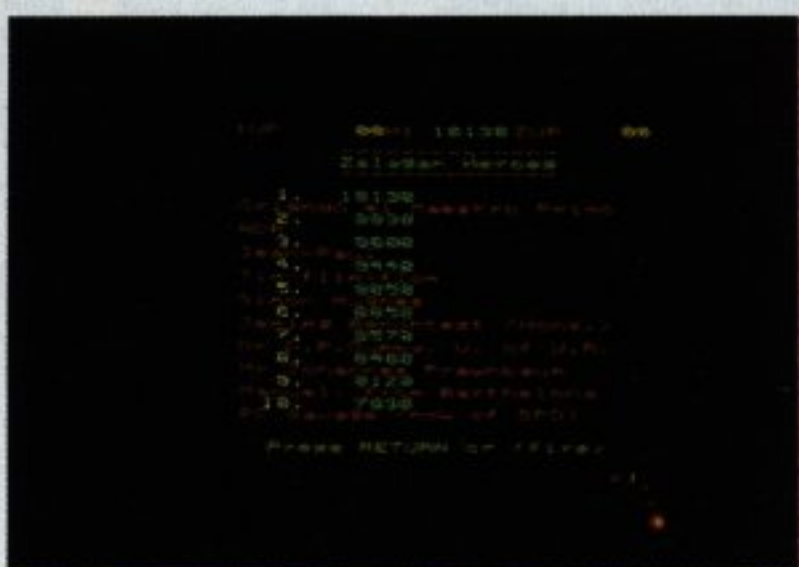
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Santa's Saucer

List of procedures

PROCSMO checks to see which keys are being pressed and moves Santa's ship accordingly.

PROCPRDR is called whenever a present is dropped, and sets up the variables for the present.

PROCPRMO moves the present downwards and checks to see if it hits anything.

PROCINIT sets up the variables at the start of each new sheet.

PROCMISET is called whenever a missile is fired by the AA gun, and initialises the variables used by the missile.

PROCDELAY (X) causes a delay of X centiseconds.

PROCHOUSE (X, Y) draws a house at X, Y.

PROCSCREEN initialises the screen.

PROCTM moves the turret of the AA gun.

PROCMI moves the missile fired by the gun and checks to see if it hits anything.

PROCSCORE (X) adds X points to the score and displays the new score.

PROCPREZ decreases the number of presents the player has and displays this number.

PROCWINDOW (X) draws a man in the window of the house specified.

PROCDEL calculates and displays the percentage of presents delivered

safely.

PROCPRNO (X) displays information about the number of presents to be delivered to the house specified.

PROCINSTRUCTIONS no prizes for guessing!

PROCTUNE (X) plays tune X. O=Jingle Bells, 1=Congratulations.

The main program variables are:

HO%(4) data concerning the houses.

HI%(4,1), HIS(4) high score variables.

SC% score.

DEL% number of successful deliveries.

TP% total number of presents dropped.

BAPRES%, PRES% number of presents the player has.

MILOC% determines the accuracy of the missiles fired by the AA gun.

X%, Y% co-ordinates of Santa's ship.

PR% flag determining state of present.

PRX%, PRY% present's co-ordinates.

PRDES% total number of presents to be delivered.

MIA% flag determining whether the plane or the missile is to be moved.

N%, M% general loop variables.

I%, X, Y used to pass parameters in procedures.

MI%, MI2%, MI3%, MI4%, MIS%,

MIS2% used to position and move missile.

RP%, RP2% plane co-ordinates.

V%, V1% sound volume variables.

SANTA has found that he cannot make all his Christmas Eve deliveries using the traditional reindeer and sledge – the world's population is just too large these days.

So he has hired a flying saucer to speed up the process.

Unfortunately the reindeer did not like being made redundant and they formed an action group. Now reindeer have a foul temper so they will stop at nothing to prevent Santa from delivering his presents.

Santa will be busy making up the presents, so he needs someone to fly the ship and drop them into chimneys. You are the one to complete this task! The world is depending on you. There are about 200,000 million houses to deliver to, so you will get plenty of practice.

The number of presents to be delivered to each house is shown on the screen, and you must drop them down its chimney. You only have a limited number of presents for each city – if you run out of presents you will be sacked.

Santa cannot bear inefficiency (see what happened to the reindeer) so you must deliver at least 60 per cent of the presents safely.

Presents are lost if you drop them on the roof of a house or on a plane, or if they are shot by the reindeer. The reindeer have an AA gun and a plane to attack you with, and their shooting becomes more accurate as the game progresses.

Instructions concerning movement are given in the program.

**Listing starts
on Page 136**



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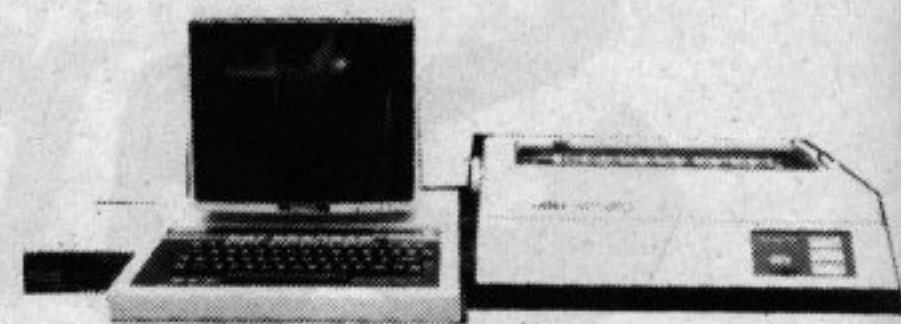


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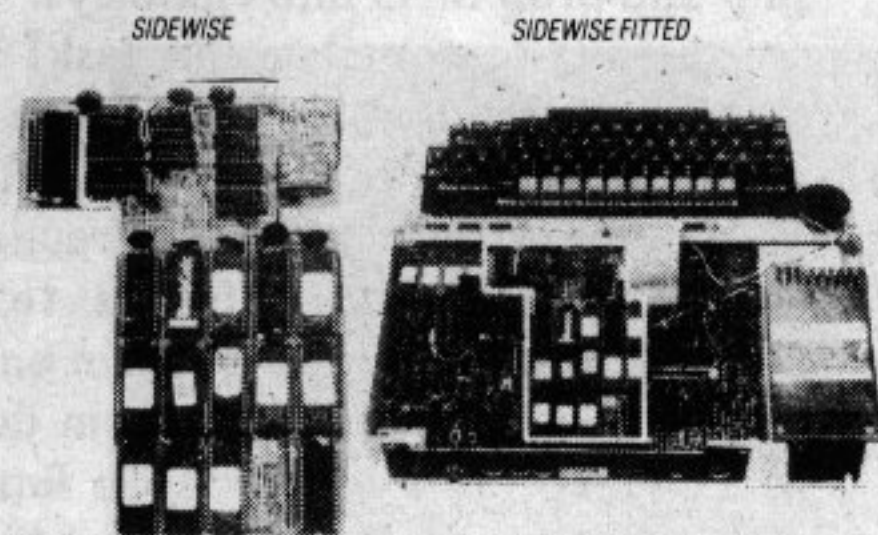
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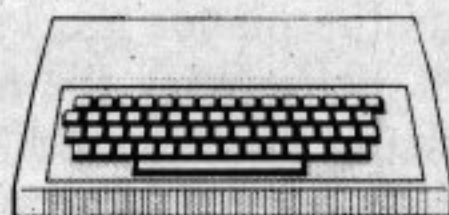
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| DDT280DP | Torch Z80 Disc Pack (800K Dual + Z80) | 695.00 | 799.25 |
| CF240 | Torch Computer twin floppies (CF240) | 2655.25 | 3053.45 |
| CF240/10 | Torch Computer 10Mb Winchester CF240/10 | 4745.25 | 5457.04 |
| CF240/21 | Torch Computer 21Mb Winchester CF240/21 | 5220.25 | 6003.29 |
| TZ80P | Torch Z80 Second Processor for BBC | 250.00 | 287.50 |
| TCBCCBAS | Torch CPN BBC Basic (Z80) | 104.50 | 120.18 |
| TCMULTIP | Torch CNP Multiplan (Spread sheet) | 179.55 | 206.48 |
| TCBERSOF | Torch CPN Perfect Software Set | 285.00 | 327.75 |
| TCPLANC | Torch CPN Plannercalc (spreadsheet) | 80.75 | 92.86 |
| TCPPFORT | Torch CPN Prospero Fortran | 209.00 | 240.35 |
| TCPPPASC | Torch CPN Prospero Pascal V2.1 | 209.00 | 240.35 |
| TCWORDST | Torch CPN Wordstar Wordprocessing | 261.25 | 300.44 |

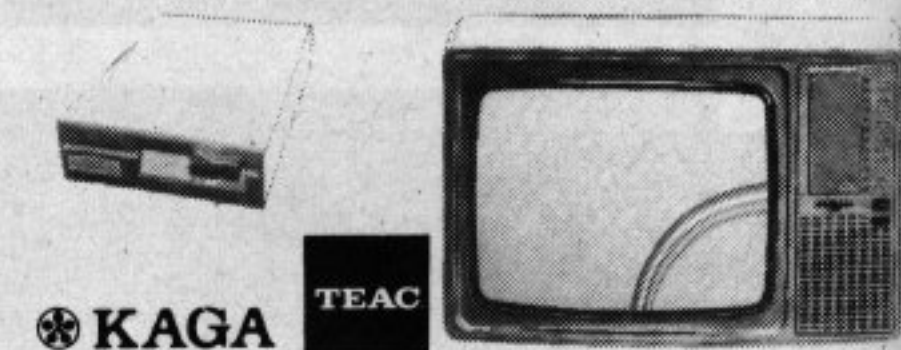


| Reference | Description | ExcVAT | IncVAT |
|-----------|--|--------|--------|
| AA1e+12 | Acorn Atom Micro 12K ram 12Krom | 82.56 | 94.95 |
| AA8e5COL | Acorn Atom 8Kram 5Krom Colour + Games Ca | 82.56 | 94.95 |
| ARASFLPT | Floating Point Rom for Acorn Atom | 19.00 | 21.85 |
| ARPPTOOL | (Programmers) Tool Box Rom for Atom | 20.00 | 23.00 |
| DDAACORN | Acorn Atom Disc Drive 100k 40T | 284.05 | 326.66 |

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| Printers | Description | ExcVAT | IncVAT |
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| PRTP1220 | Film Ribbon for Smiths Corona TP-1 | 2.85 | 3.28 |
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| PTJ6100 | Junki 6100 Daisy Wheel Printer 18cps | 365.09 | 419.85 |
| PTJP101 | BBC Spark-Jet Printer | 284.05 | 326.66 |
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| PTMX80 | Epson MX-80 80cps Dot matrix printer | 350.55 | 403.13 |
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| PTRX80FT | Epson RX-80FT Printer 100cps (T/Fric) | 280.25 | 322.29 |
| PTT1040 | TEC F10-40 40cps Daisy Wheel Printer | 1220.75 | 1403.86 |
| PTTCOLR | Torch Colour Printer | 1472.50 | 1693.38 |

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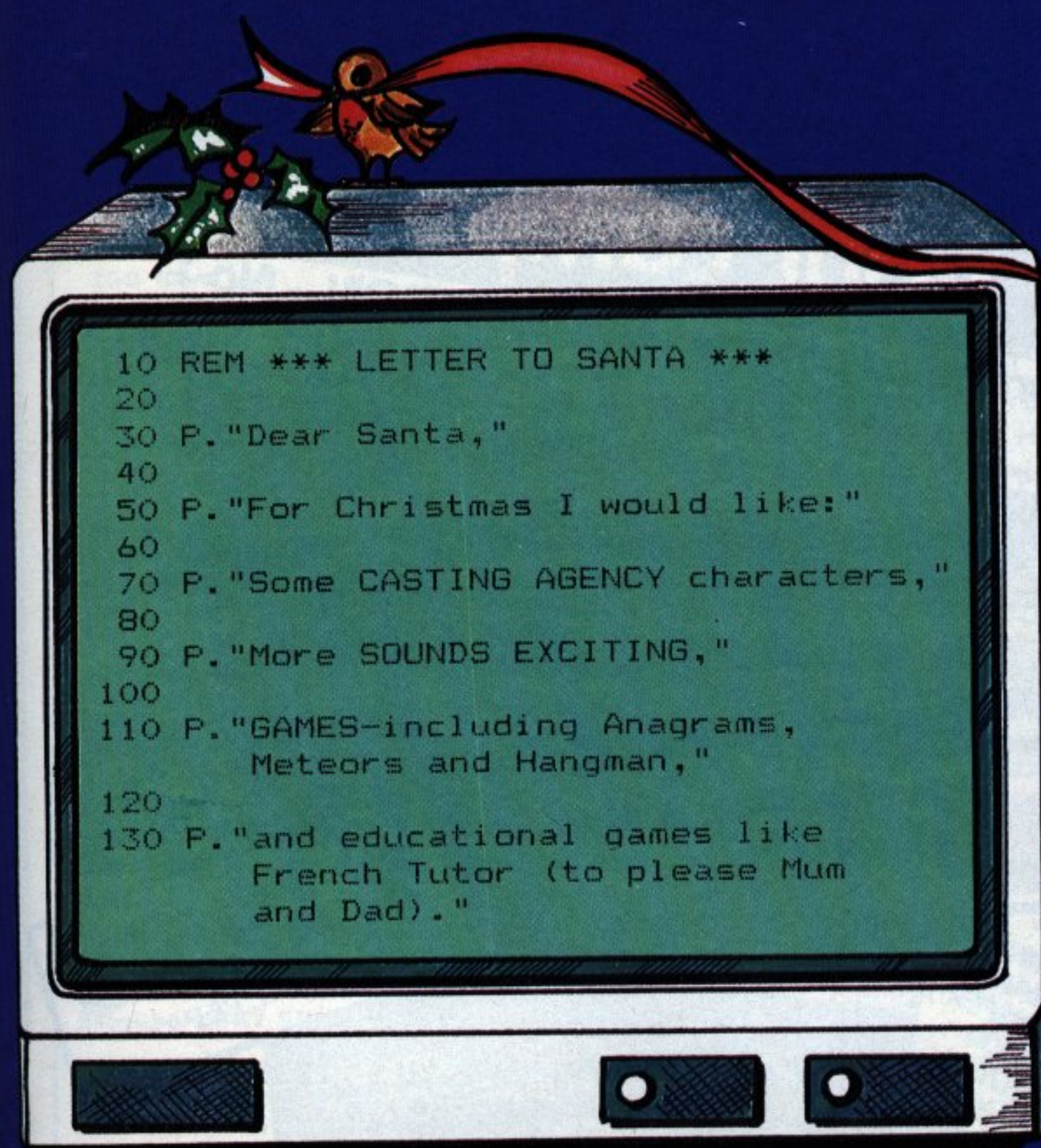
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electron

user

Vol. 1 No. 3 December 1983



All listings in this issue of
Electron User can also be
used on the BBC Micro

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WELSH TAKE THE LEAD WITH ELECTRON ADD-ONS

WITH a candour far too often lacking from the world of microcomputing, Acorn today admitted it is having problems with the production of Electrons.

However, despite strong rumours to the contrary from informed sources, it denied the ULA was giving difficulties.

Said an Acorn spokesman, "We are meeting production targets, but the targets are too low".

He went on to explain that demand was totally unexpected, exceeding

Acorn admits problems

anything previously experienced in the field of microcomputing.

Commented one dealer, "You'd think they would have learnt from the problems with the BBC Micro".

THE Welsh seem to have the edge in the potentially massive Electron add-on market.

Following the news that AB Electronics of Gwent will be producing Electrons at the rate of 4,000 a week from January comes word of two more Welsh firms producing products for Acorn's latest micro.

The first is the Hobbit, a floppy tape system for recording programs which is being adapted for use with the Electron.

Produced by Ikon Computer Products of Dyfed, the Hobbit is both faster and more

More hardware for Xmas

reliable than a conventional tape recorder and promises to be the first mass storage system available for the Electron.

A proven success with the BBC Micro, it will offer Electron owners the performance normally associated with disc drives.

Meanwhile, in Cardiff, Sir Computers is producing two hardware add-ons for the Electron in time to catch the Christmas rush.

The first is a combined A to D (joystick) and Centronics printer interface which will considerably increase the

scope of the Electron.

Sir will also be marketing an 8 ROM expansion board which will allow extra chips to be added to the micro.

This will allow instant loading of alternative languages and other chip-based software, making the Electron easily the most powerful machine of its class.

New trio from A&F

A&F Software of Manchester has added three more titles to its Electron range.

The trio, Cylon Attack, Chuckie Egg and Pharaoh's Tomb, are new versions of the successful BBC Micro programs specially adapted for the Electron.

electron user

Electron User welcomes program listings and articles for publication. Listings should be accompanied by cassette tape or disc.

Send to:
Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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THIS is the ad that is causing red faces at W.H. Smiths. For, like all Electron dealers, the chain just cannot get enough of them.

The ad proclaims: "We're the only major store that stocks it". But "stock" isn't quite the right word.

Said a Smith's spokesperson, "As soon as we get the Electrons in we sell them. We

would like to have more, but Acorn is unable to meet the demand".

So what were my chances of getting an Electron from Smiths?

"That's rather a naive question. We are in the hands of Acorn.

"And you must remember that our advertising is planned well in advance - this one's turned out to have rather a sting in the tail".

Disc drive race on

THE race is on to develop disc drives for the Electron.

So far the front runners seem to be Bradford-based Pace, whose disc interface is nearing completion. Using a modified version of the Amcom DFS, the device contains an integral power supply and disc drive.

The unit also features a duplicate Electron edge connector to allow for other add-ons, such as the printer interface that Pace are currently working on.

Pace will be launching the drives at the BBC Micro User Show in December.

THE MICRO



KID

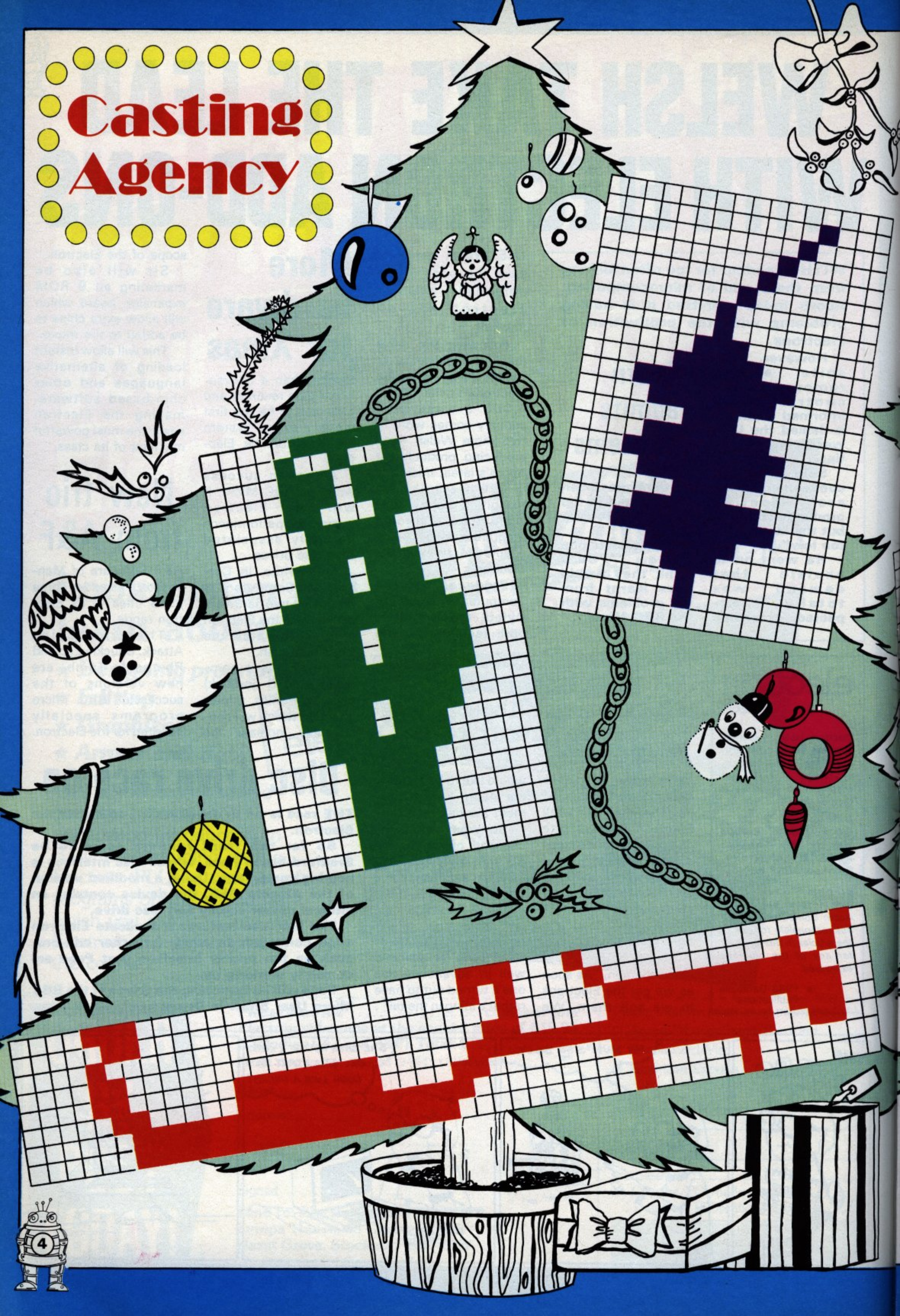
MY MUM'S SO SILLY...

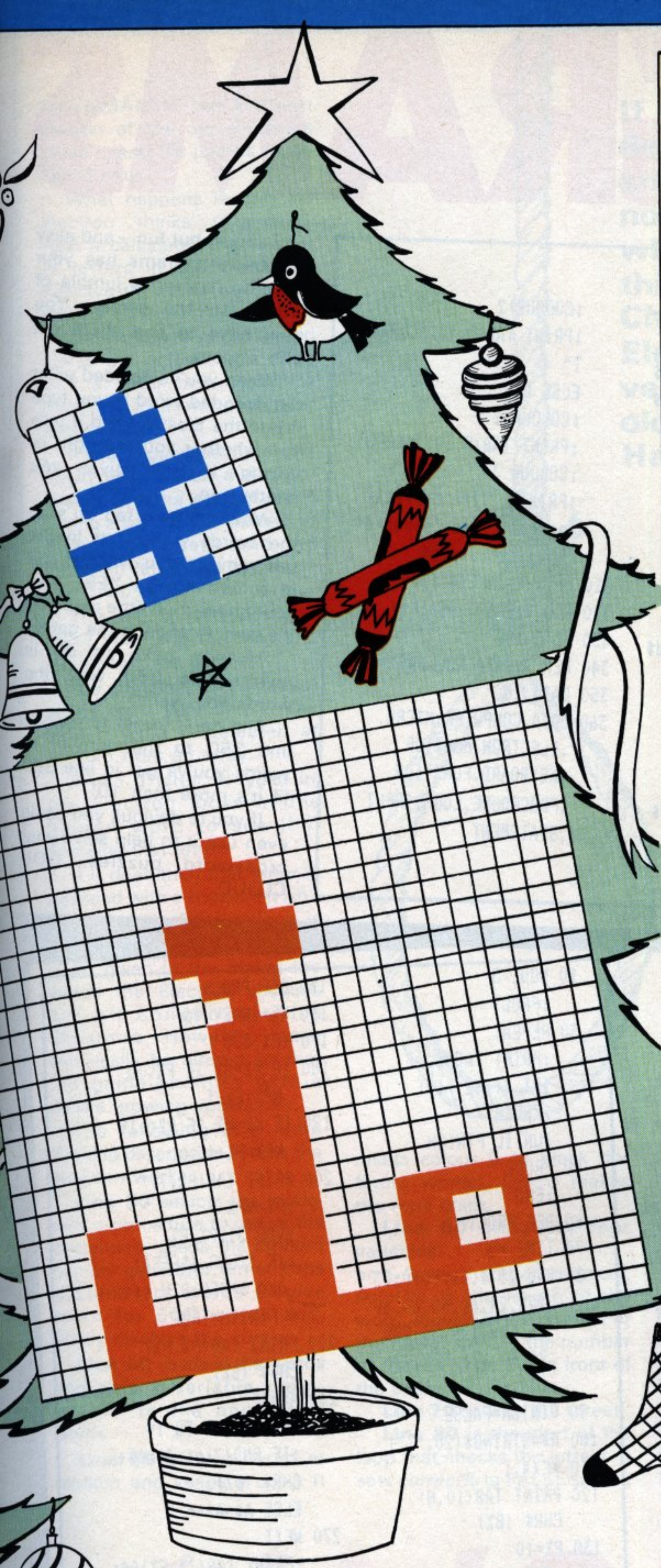


SHE SAYS THAT IF I CARRY ON... I'LL START TO LOOK LIKE A MICRO!



Casting Agency





**Bring these handy characters to life
in your own Electron programs with
these ready-to-go listings.
There'll be more next month!**

Snowman

VDU 23,235,124,146,
238,198,124,124,238

VDU 23,236,0,1,3,
3,3,3,1,1

VDU 23,237,238,255,255,
239,239,255,255,239

VDU 23,238,0,0,128,
128,128,128,0,0

VDU 23,239,238,254,124,
124,124,124,124,124

Candle

VDU 23,246,0,0,0,
0,8,28,28,62

VDU 23,247,62,28,6,
28,28,28,28,28

VDU 23,248,0,0,6,
6,6,6,7,7

VDU 23,249,28,28,28,
28,28,28,255,255

VDU 23,250,0,0,124,
100,100,124,224,224

Christmas Tree

VDU 23,234,16,56,16,
124,16,254,16,56

Reindeer & Sleigh

VDU 23,228,224,100,128,
192,192,96,63,31

VDU 23,229,0,0,0,
0,255,255,255,255

VDU 23,230,7,5,1,
3,7,12,248,240

VDU 23,231,16,8,7,
7,255,7,2,2

VDU 23,232,0,1,255,
255,253,252,8,8

VDU 23,233,32,62,128,
192,192,192,0,0

Holly

VDU 23,240,0,0,0,
1,2,4,8,16

VDU 23,241,0,0,128,
0,0,0,0,0

VDU 23,242,0,0,0,
1,0,0,0,1

VDU 23,243,16,56,124,
255,254,56,254,255

VDU 23,244,0,0,0,
1,0,0,0,0

VDU 23,245,254,56,254,
255,124,56,16,16

HAVE you a favourite character you would like to see in
this monthly feature in Electron User?
Send your drawing of the character, together with the
VDU23 statement, to: Shape Dictionary, Electron User,
Europa House, 68 Chester Road, Hazel Grove, Stockport
SK7 5NY.

ANAGRAMS

```

100 REM ANAGRAMS
110 REM **INITIALIZE**
120 READ numwords%
130 AZ=RND(-TIME)
   :DIM word$(numwords%)
   :MODE 5
140 FOR count%=1 TO numwords%
   :READ word$(count%)
   :NEXT
150 REM **SELECT WORD**
160 thisword$=word$(
   RND(numwords%))
   :mixword$=""
   :bitleft$=thisword$
   :count%=LEN (thisword$)
170 REM **MIX WORD UP**
180 REPEAT
190 rnd=RND(count%)
200 mixword$=mixword$+
   MID$(bitleft$,rnd
   ,1)
210 bitleft$=LEFT$(bitleft$
   ,rnd-1)+RIGHT$(bitleft$
   ,LEN (bitleft$)-rnd)
220 count%=count%-1
230 UNTIL bitleft$=""
240 IF thisword$=mixword$
   THEN 160
250 REM **INPUT ANSWER**
260 CLS
270 COLOUR 1
   :PRINT TAB(5,5)mixword$
280 COLOUR 2
   :INPUT TAB(0,8)"Type
   in your answer"
   TAB(5,11)myanswer$
290 REM **CHECK ANSWER**
300 IF myanswer$=thisword$
   CLS
   :COLOUR 2
   :PRINT TAB(5,10)"CORREC
   T"
   ELSE CLS
   :COLOUR 1
   :PRINT TAB(5,10)"WRONG"
   :COLOUR 3
   :PRINT "The correct
   answer""to "mixword$
   ""is "thisword$
310 delay$=INKEY$ (500)
320 REM **START AGAIN**
330 GOTO 160
340 REM **DATA FOLLOWS**
350 DATA 10
360 DATA COMPUTER,MICRO
   ,ELECTRON,MONITOR
   ,KEYBOARD,FUNCTION
   ,PROCEDURE,LOOP,INPUT
   ,STATEMENT

```

IT'S simple but fun – and easy to play. Anagrams has your Electron flashing a jumble of letters on the screen. You then have to sort them out into a word.

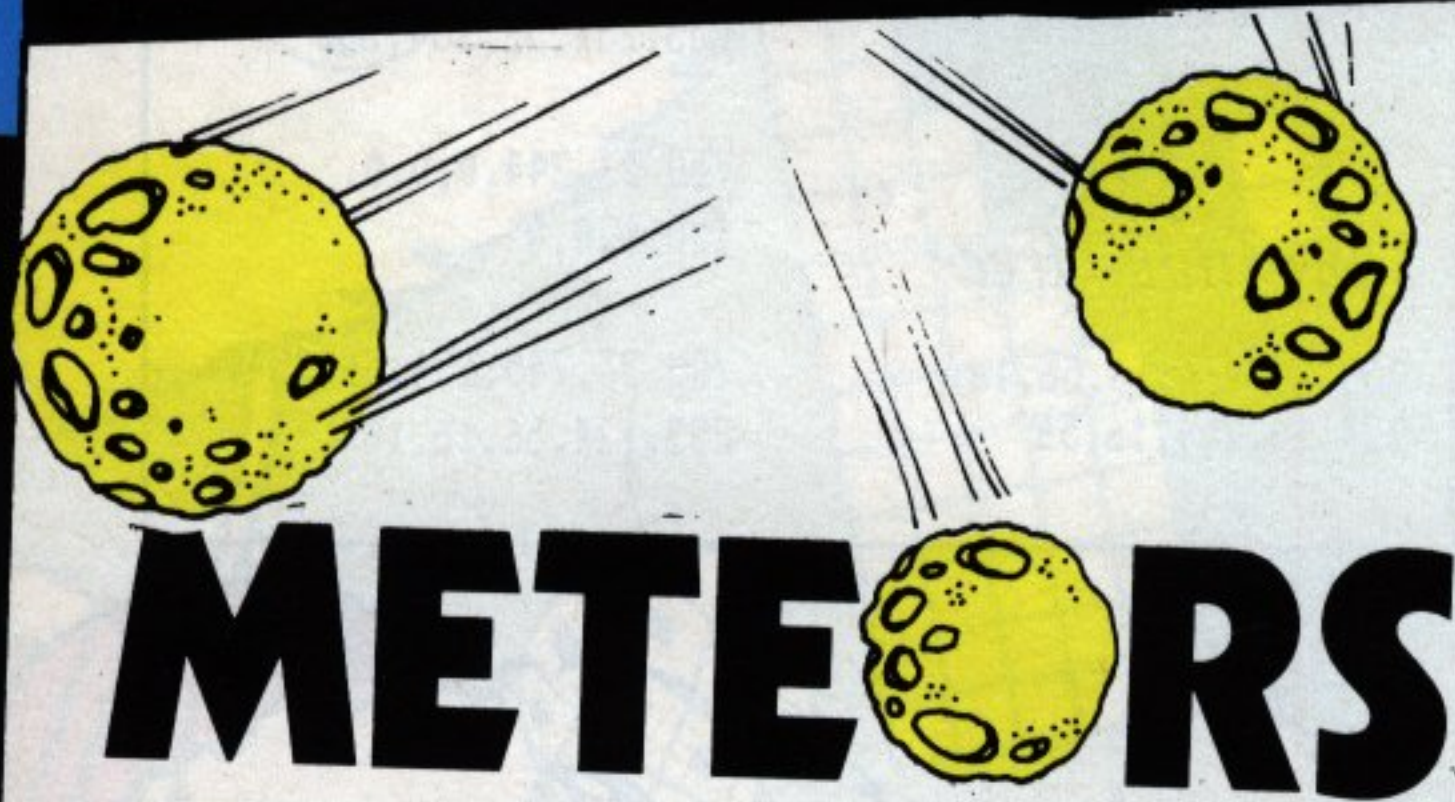
When you've decided what the decoded word is you type it into the Electron and it tells you whether you are right or wrong. It then gives you another go.

When you get fed up with the words we've put in the program (or you want to put in something like XEBEC for your know-it-all little nephew) it's easy to change the game.

All you have to do is rewrite line 360 with the words you want.

And don't forget to change line 350 to the number of words you've got in line 360 (if it's more than 10).

If you're devious you could even use it to help solve your crossword puzzles. GOK CLOUD.



METEORS

PICTURE it. You're travelling in space and your ship's detector screens warn you that a meteor storm is approaching.

It's so big and going so fast that you don't stand a chance of getting out of its path.

You just have to let it overtake you and hope

that you can dodge out of the way of the meteors.

You do this by using the left and right cursor keys to guide your craft.

Your inboard computer (a bit of a games freak) treats the whole thing as a joke and decides to keep a record of your "score" – that is, how long you stay alive.

How long can you survive? Try it and see.

```

10 MODE 5
   :PROCI
30 REPEAT
   :PRINT TAB(5,0)
   INT (TIME /10)
   :PROCS
   :UNTIL FINISH
40 PROCE
   :END
60 DEF PROC1
70 TIME =0
80 VDU 23,1,0:0:0:0:23
   ,224,24,60,60,60,60
   ,66,129,129,23,225
   ,24,60,126,126,126
   ,126,60,24
90 FINISH=FALSE
100 A$=STRING$(20," ")
110 *FX4,1
120 PRINT TAB(10,8)
   CHR$ (B%)
130 P%=10
   :NP%=P%
   :A%=135
   :B%=224
   :D%=225
   :E%=31
   :F%=8
   :G%=136
   :H%=137
140 ENDPROC
150 DEF PROCS
160 K%=INKEY (0)
170 *FX15,0
180 IF K%=G% IF P%<>0
   NP%=P%-1
190 IF K%=H% IF P%<>19
   NP%=P%+1
200 PRINT TAB(P%,7)" "
   :P%=NP%
   :VDU 31,P%,F%
   :IF ((USR (&FFF4)
   AND &FFFF)DIV &100)=12
   9 FINISH=TRUE
220 PRINT TAB(P%,F%)
   CHR$ (B%)
230 A$=""
   :FOR I%=Z% TO 19
   :IF RND(7)=1 A$=A$+
   CHR$ (D%)
   ELSE A$=A$+" "
270 NEXT
   :PRINT TAB(Z%,E%)A$:
   :ENDPROC
340 DEF PROCE
350 *FX4,0
360 PRINT 'TAB(31,0) "YOUR
   SCORE WAS ":INT (
   TIME /10)
370 *FX15,0
380 END

```



HANGMAN is the Electron version of the old children's game — and it's just as much fun to play.

What happens is that the Electron "thinks" of a word. Next it calculates the number of letters in the word and displays the same number of dashes on the screen.

Then it's up to you to try and guess the hidden word. You pick a letter that you think might be in it and press that letter's key.

If you've guessed rightly the micro will replace a dash or dashes with the letter. If you're wrong a part of the gallows or man will appear and the mistaken letter will appear in the "tried" list.

The eighth mistake you make will hang the man and you've lost the game.

The principle the program works on is very simple. The hidden word is selected at random from an array.

When a letter is typed in, the Electron looks at the hidden word to see if it contains that letter.

If it does then that letter is replaced with a space. If it isn't another part of the gallows is drawn.

As given in the listing the words the Electron chooses are all concerned with Christmas. However, these can easily be altered so that the game changes with a child's growing vocabulary.

The following is a more detailed description of how the program works:

Line 30 selects the mode, calls a procedure to define the characters, seeds the random number generator, dimensions the array of words to give room for 500 words and, finally disables the cursor.

Line 40 reads in the words and sets a variable, *num-word%*, to the number of words.

Line 50 picks a word at random and keeps a copy. It

resets colour 0 to black (for future words). *C%=0* makes the rope black.

Line 60 initialises four variables:

err% is the number of errors, *length%* is the length of the word, *move%* is the number of the move, *spc%* is the number of spaces to be put in front of the dashes.

Line 70 sets up the screen.

Line 80 is the start of the loop that checks the letters. It sets *correct%* to FALSE so that

If you're just
dangling
around at a
noose end,
why not key in
this clever
Christmas
Electron
version of that
old favourite,
Hangman?



By PETE
DAVIDSON

it can be set to TRUE if the letter is in the word. The program then waits for a letter to be pressed.

Line 90 increments the move counter.

Lines 100-150 check the letter and change *correct%* to TRUE if the letter is in the word and displays it on screen.

Line 160 prints incorrect letters in the "tried" column.

Line 170 checks if the word is all spaces and calls PROCwon if it is. If not it adds

one more to the error count and calls PROChang.

Provided fewer than eight errors have been made the program returns to line 80 for another go.

Line 180. Before reaching this line either PROCwon or PROChung will have been executed. Both then call PROCanothergo and this line accepts the answer.

Lines 190-220. PROCwon changes everything that is coloured black to the background colour and prints the gallows on the screen.

As the gallows are now in the background colour, only the man is shown. *C%* is also set to 5 so the man's neck shows up. PROCanothergo is also called in this procedure.

Lines 230-250. PROC-hang jumps into the subroutine from lines 340-430. Exactly where it jumps to depends on how many errors have been made.

Lines 260-300. PROC-hung prints the correct word on the screen and calls PROCanothergo.

Lines 310-330. PROC-anothergo prints the question on the screen.

Lines 340-430. This subroutine calls the various procedures to draw the pieces of the gallows and man. It is entered at various points depending on the value of *err%* in line 240.

Lines 440-510 cause the various parts to be drawn on screen.

Lines 520-700 define the characters.

Line 1000 contains the list of words that the Electron picks from. It's here that you can put in your own words by just typing them in after the DATA statement. Each word must be separated by a comma. You can't have more than 500 of them.

Line 5000 is the final piece of data, EOF. Your own data must come before this line which must not be removed.

HANGMAN



HANGMAN LISTING

From Page 7

```

10 REM HANGMAN
20 REM (C)ELECTRON USER
30 MODE 2
   :PROCdefine
   :X%=RND(-TIME )
   :DIM word$(500)
   :VDU 23;8202;0;0;0;
40 count%=0
   :REPEAT
   :count%=count%+1
   :READ word$(count%)
   :UNTIL word$(count%)=
   "EOF"
   :numwrđ%=count%-1
50 word$=word$(RND(numwrđ%))
   :copy$=word$
   :VDU 19,0,0,0,0,0
   :C%=0
60 err%=0
   :length%=LEN (word$)
   :move%=1
   :spc%=(20-length%)/2
70 COLOUR 130
   :CLS
   :COLOUR 1
   :PRINT TAB(14,1)"TRIED"
   :COLOUR 8
   :PRINT TAB(spc%,26)
   STRING$(length%,"-")
80 correct%=FALSE
   :COLOUR 4
   :PRINT TAB(3,29)"This
   is move ";move%
   :COLOUR 12
   :PRINT "  PRESS A LETTE
   R";
   :letter$=GET$
90 move%=move%+1
100 FOR count%=1TO length%
110 IF letter$(>)MID$(word$
   ,count%,1)
   THEN 150
120 word$=LEFT$(word$,count%-
   1)+" "+MID$(word$,count%+
   1)
130 COLOUR 5
   :PRINT TAB(spc%+count%-1
   ,26)letter$
140 correct%=TRUE
150 NEXT
160 IF correct%=FALSE
   THEN COLOUR 7
   :PRINT TAB(16,3+2*err%)le
   tter$
170 IF word$=STRING$(length%
   ," ")
   THEN PROCwon
   ELSE IF correct%=

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```

   ELSE err%=err%+1
   :PROCchang
   :IF err%<8
   THEN 80
180 get$=GET$
   :IF get$="Y"
   THEN 50
   ELSE IF get$(<)"N"
   THEN 180
   ELSE CLS
   :END
190 DEF PROCwon
200 VDU 19,0,2,0,0,0
   :C%=5
   :GOSUB 340
   :COLOUR 11
   :VDU 7
   :PRINT TAB(0,26)"
   WELL DONE "
210 PROCanothergo
220 ENDPROC
230 DEF PROCchang
240 ON err%GOSUB 410 ,400
   ,390 ,380 ,370 ,360
   ,350 ,340
250 ENDPROC
260 DEF PROCchung
270 COLOUR 14
   :PRINT TAB(4,26)"YOU'RE
   HUNG"
280 VDU 7
   :COLOUR 9
   :PRINT "  THE WORD
   WAS "SPC ((18-LEN (copy
   $))/2)copy$;SPC ((18-
   LEN (copy$))/2)
290 PROCanothergo
300 ENDPROC
310 DEF PROCanothergo
320 COLOUR 12
   :PRINT "  ANOTHER
   GO? ";
330 ENDPROC
340 PROCFEET
350 PROCLEGS
360 PROCARMS
370 PROCBODY
380 PROCHEAD
390 PROCTOP
400 PROCUPRIGHT
410 PROCBASE
420 IF err%=8
   THEN PROCchung
430 RETURN
440 DEF PROCFEET
   :COLOUR 1
   :VDU 31,5,16,235,236
   ,237,238
   :ENDPROC
450 DEF PROCLEGS
   :COLOUR 4
   :VDU 31,6,11
   :FOR I%=1TO 2
   :VDU 234,234,10,8,8
   :NEXT
   :FOR I%=1TO 3
   :VDU 231,232,10,8,8
   :NEXT
   :ENDPROC
460 DEF PROCARMS
   :COLOUR 5
   :VDU 31,5,6
   :FOR I%=1TO 2
   :VDU 233,9,9,233,10
   ,8,8,8,8
   :NEXT
   :FOR I%=1TO 3
   :VDU 231,9,9,232,10
   ,8,8,8,8
   :NEXT
   :COLOUR 3
   :VDU 239,9,9,240
   :ENDPROC
470 DEF PROCBODY
   :COLOUR 5
   :VDU 31,6,6
   :FOR I%=1TO 5
   :VDU 233,233,10,8,8
   :NEXT
   :ENDPROC
480 DEF PROCHEAD
   :COLOUR 3
   :VDU 31,6,3,227,228
   ,10,8,8,229,230
   :COLOUR C%
   :VDU 10,8,8,232,231
   :ENDPROC
490 DEF PROCBASE
   :COLOUR 0
   :VDU 31,1,20
   :FOR I%=1TO 10
   :VDU 224
   :NEXT
   :ENDPROC
500 DEF PROCUPRIGHT
   :COLOUR 0
   :VDU 31,2,2

```

```

   :FOR I%=1TO 18
   :VDU 224,10,8
   :NEXT
   :ENDPROC
510 DEF PROCTOP
   :COLOUR 0
   :VDU 31,1,1
   :FOR I%=1TO 10
   :VDU 224
   :NEXT
   :VDU 31,6,2,226,225
   :ENDPROC
520 DEF PROCdefine
530 VDU 23,224,255,195,165
   ,153,153,165,195,255
540 VDU 23,225,128,192,128
   ,192,128,192,128,192
550 VDU 23,226,3,1,3,1,3
   ,1,3,1
560 VDU 23,227,31,31,255
   ,31,33,127,243,254
570 VDU 23,228,248,248,255
   ,248,132,254,207,127
580 VDU 23,229,124,124,119
   ,59,28,15,15,15
590 VDU 23,230,62,62,238
   ,220,56,240,240,240
600 VDU 23,231,240,240,240
   ,240,240,240,240,240
610 VDU 23,232,15,15,15
   ,15,15,15,15,15
620 VDU 23,233,255,239,199
   ,171,239,239,255,255
630 VDU 23,234,255,255,255
   ,255,255,255,255,255
640 VDU 23,235,0,0,1,63
   ,127,255,254,120
650 VDU 23,236,240,240,248
   ,252,252,248,120,120
660 VDU 23,237,15,15,31
   ,63,63,31,30,30
670 VDU 23,238,0,0,128,252
   ,254,255,127,30
680 VDU 23,239,240,248,124
   ,126,213,85,85,85
690 VDU 23,240,15,31,62
   ,126,171,170,170,42
700 ENDPROC
1000 DATA CHRISTMAS,SANTA
   ,HOLLY,ANGEL,SLEIGH
   ,TINSEL,CRACKERS,PUDDING
   ,TURKEY,SNOW,FAIRY,DECORA
   TIONS,PRESENTS,GIFTS
   ,PARTIES,TRIFLE,FAMILY
   ,CARDS
5000 DATA EOF

```

This listing is included in this month's cassette tape offer. See order form on Page 99 of The Micro User.





FRENCH TUTOR

DID you think that your micro was limited to Basic English? Well with our French Tutor the Electron starts to speak French.

The micro will put a sentence on the television screen and you have to type in the correct answer. If you get it wrong it'll

tell you and display what it should have been.

At the end you get a score, and the chance to do it all again.

And you're not limited to French. You can use any language you like by changing the DATA statements.

But let's start with French. Over to you. Or do I mean vous?

```
10 REM ** FRENCH VERBS
**
```

```
20 REM (C)ELECTRON USER
30 CLS
```

```
40 PRINT TAB(5) "In
this test, you must"
40 PRINT TAB(5) "copy
the punctuation marks"
```

```
50 PRINT TAB(5) "exactly,
because if you "
60 PRINT TAB(5) "don't,
the computer, being"
```

```
70 PRINT TAB(5) "literal-m
inded, will think "
80 PRINT TAB(5) "you have
made a mistake!"
```

```
90 PRINT
: PRINT TAB(5) "N.B.
'You' is translated"
```

```
100 PRINT TAB(5) "as 'Vous'
(2nd person plural)."
```

```
110 PRINT
: PRINT TAB(5) "Unfortun
ately, all accents"
```

```
120 PRINT TAB(5) "have
```

to be omitted."

```
130 PRINT
```

```
140 REPEAT
```

```
150 LET T=0
```

```
160 FOR K=1 TO 21
```

```
170 READ E$, F$
```

```
180 PRINT "WHAT IS "E$
"?"
```

```
190 INPUT X$
```

```
200 IF X$=F$
```

```
THEN PRINT "C'EST JUSTE
!"
```

```
: LET T=T+1
```

```
210 PRINT
```

```
220 IF X$<>F$
```

```
THEN PRINT "FAUX! VOICI
```

```
LE MOT JUSTE: "F$
```

```
: SOUND 1,-15,89,10
```

```
230 PRINT
```

```
240 NEXT K
```

```
250 PRINT "YOUR SCORE IS:
";T;" OUT OF 21"
```

```
260 PRINT
```

```
:PRINT
```

```
270 RESTORE
```

```
280 UNTIL FALSE
```

```
290 DATA "I don't know"
,"Je ne sais pas"
```

```
300 DATA "When will you
come?","Quand viendrez
-vous?"
```

```
310 DATA "I will write
to you","Je vous ecri
rai"
```

```
320 RESTORE
```

```
330 DATA "I like French
wine","J'aime bien
le vin francais"
```

```
340 DATA "How much is it?"
,"C'est combien?"
```

```
350 DATA "I'm waiting for
an answer","J'attends
une reponse"
```

```
360 DATA "What time is
it?","Quelle heure
est-il?"
```

```
370 DATA "It's six o'clock"
,"Il est six heures"
```

```
380 DATA "What colour is
it?","C'est de quelle
couleur?"
```

```
390 DATA "I'm going out
now","Je sors mainten
ant"
```

```
400 DATA "I'm going to
the airport","Je
```

```
410 DATA "Hurry up, I'm
late!","Depechez-vous,
je suis en retard!"
```

```
420 DATA "Is it far?"
,"Est-ce que c'est
loin?"
```

```
430 DATA "Go away!","Allez
-vous en!"
```

```
440 DATA "I have no money"
,"Je n'ai pas d'argent"
```

```
450 DATA "I'm going home"
,"Je rentre chez moi"
```

```
460 DATA "I'll be there
in an hour","Je serai
la dans une heure"
```

```
470 DATA "Will you wait?"
,"Attendez-vous?"
```

```
480 DATA "What's your name?"
,"Comment vous appele
z-vous?"
```

```
490 DATA "Shall I see you
again?","Vous reverrai
-je?"
```

```
500 DATA "Until the next
time..","A la prochain
e fois.."
```

```
510 END
```


The new boy from Acorn already has a gang of playmates.

The Acorn Electron, Britain's most exciting new home micro, already has a range of software programs specially designed for it by Acornsoft, makers of software for the BBC Micro.

There are six mind-boggling games, two programming languages, two exciting graphics cassettes, a home educational program and a personal money management program.

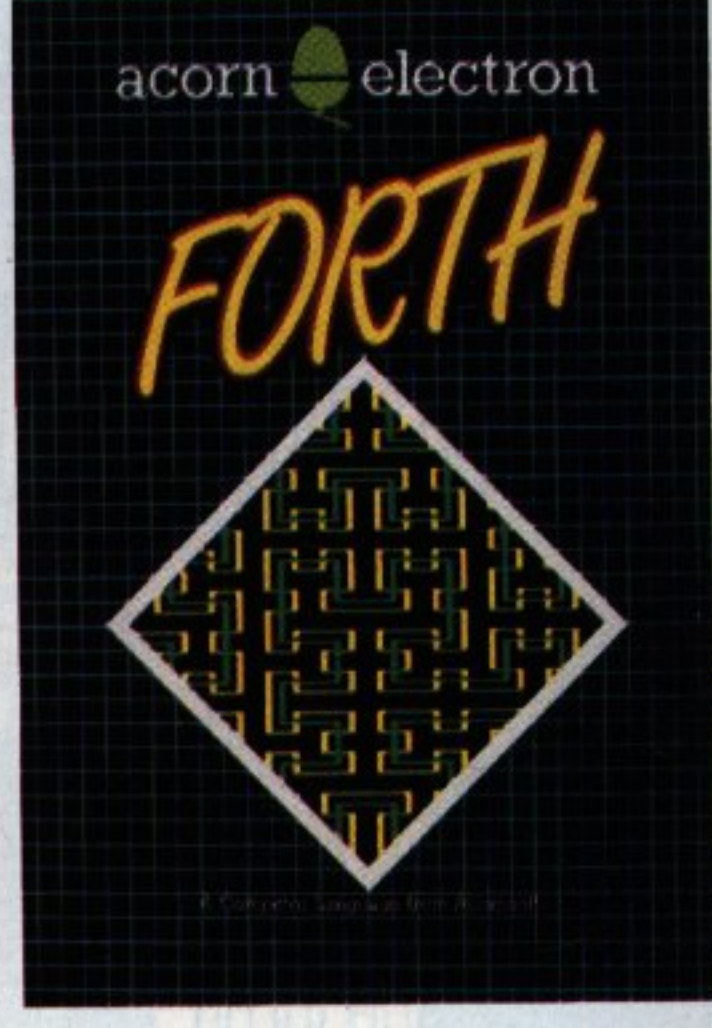
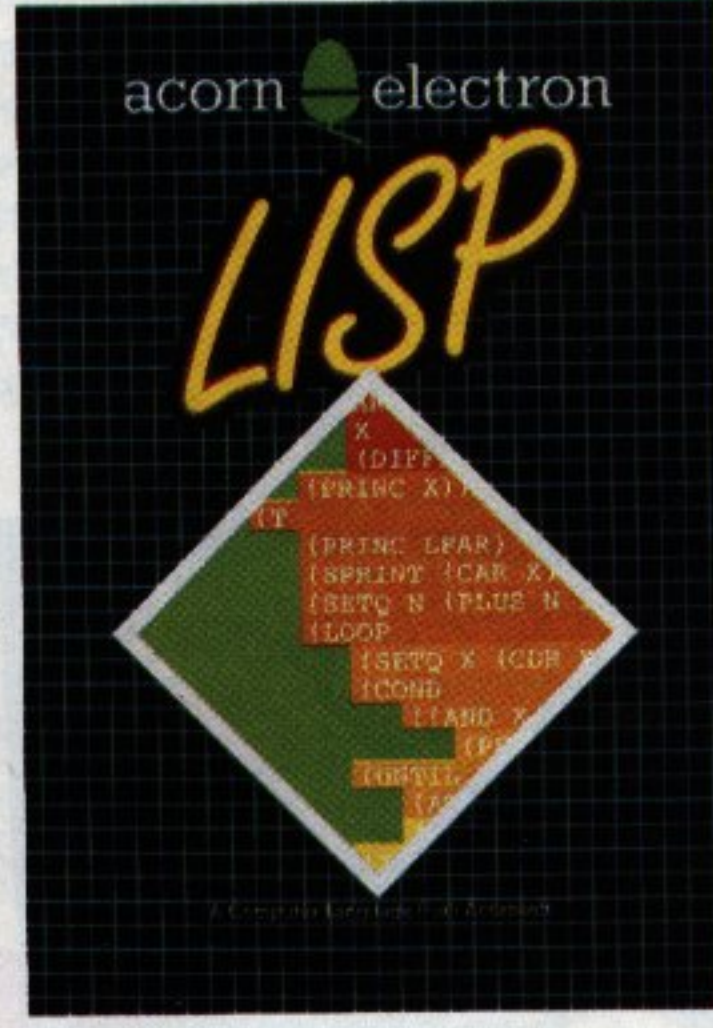
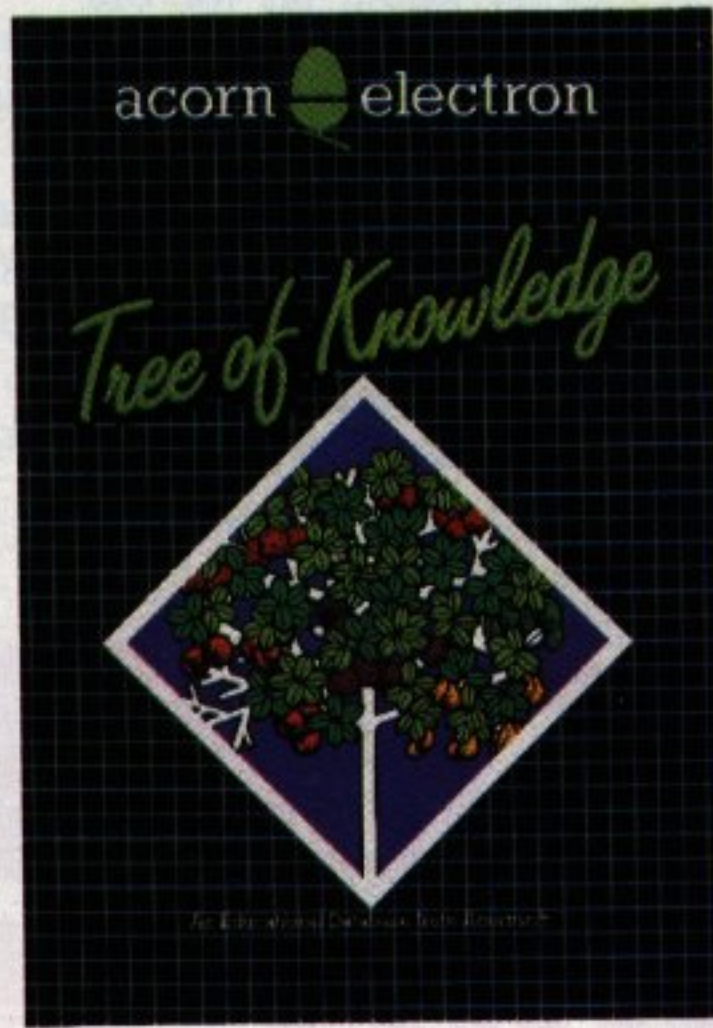
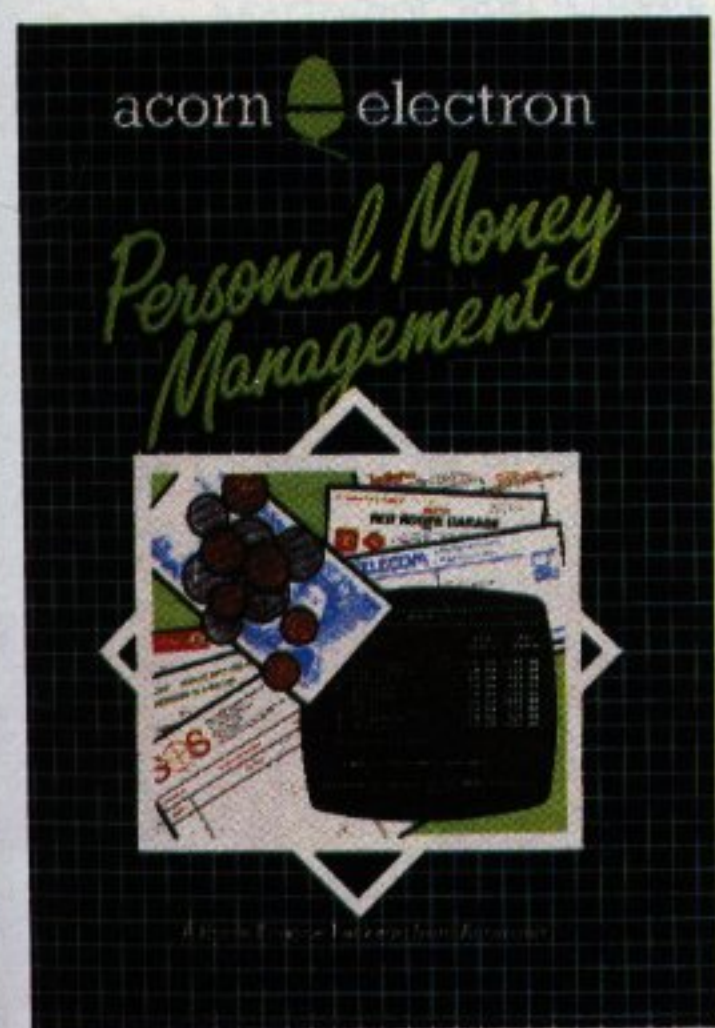
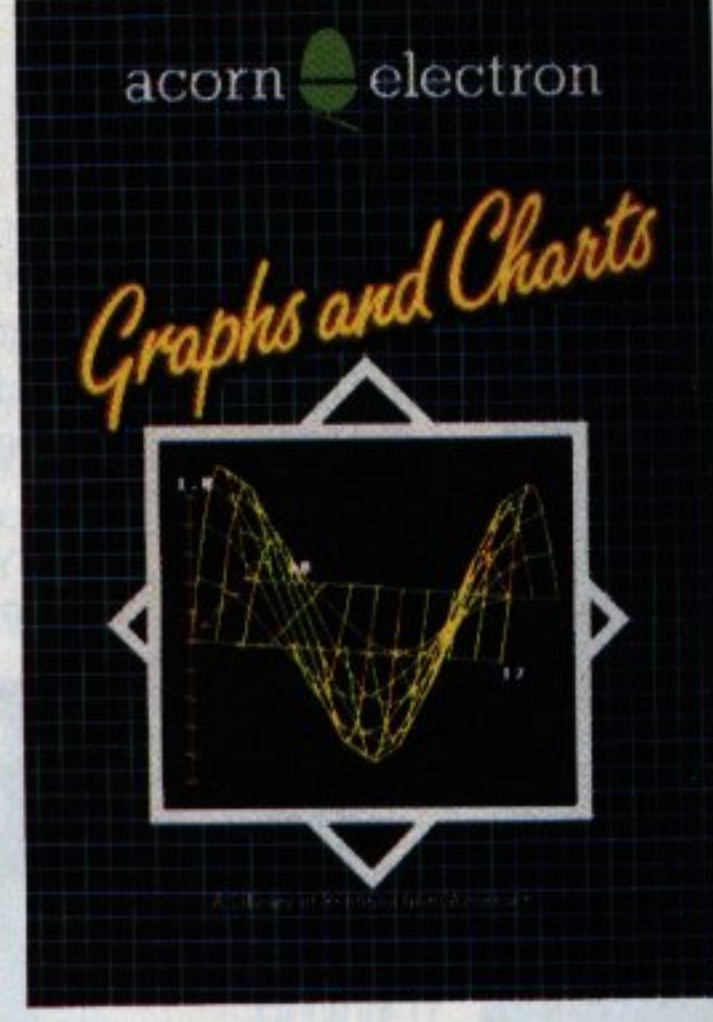
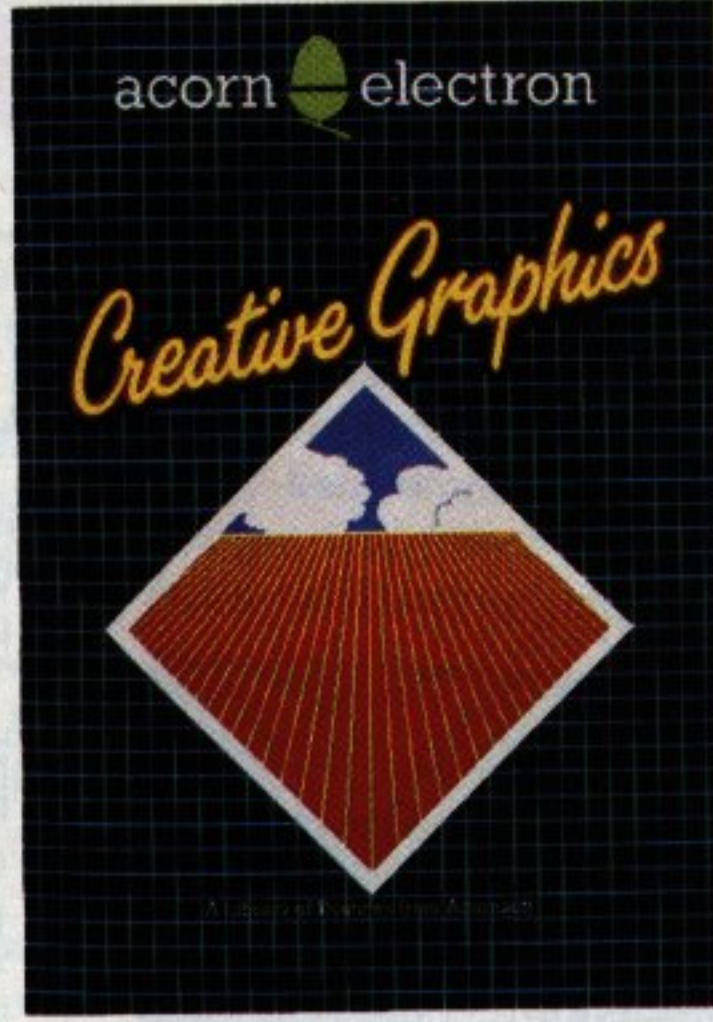
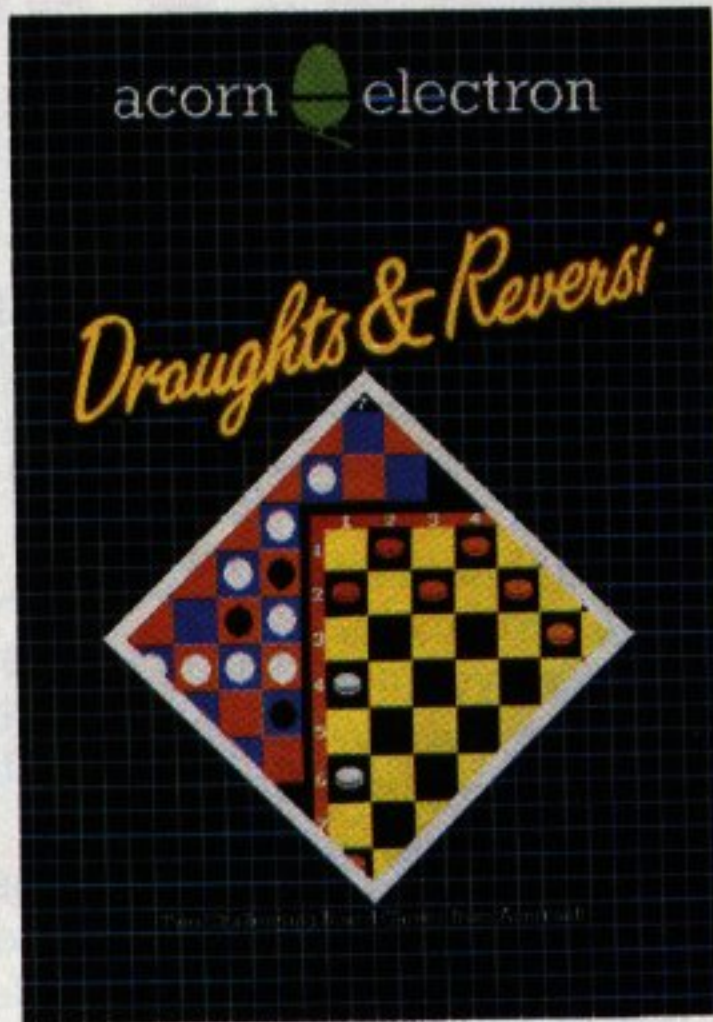
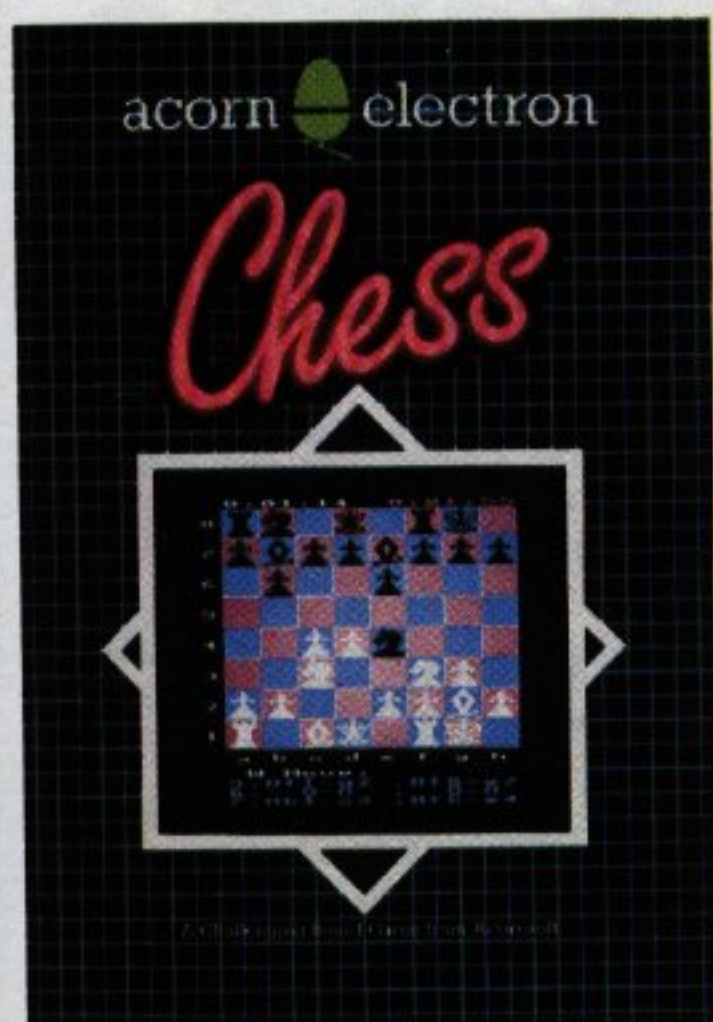
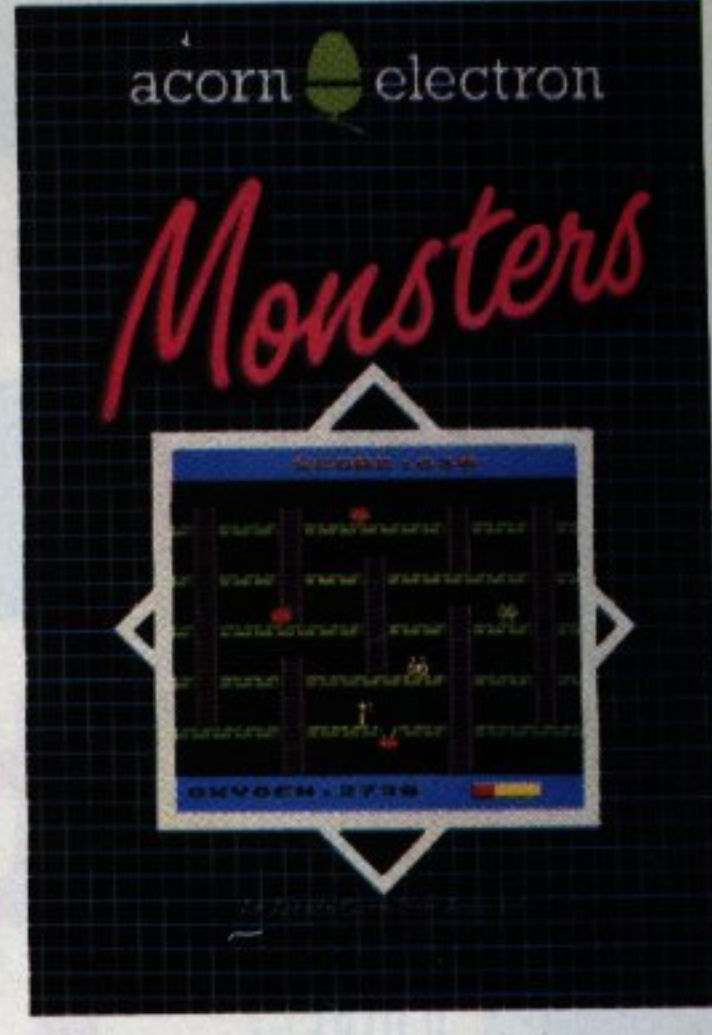
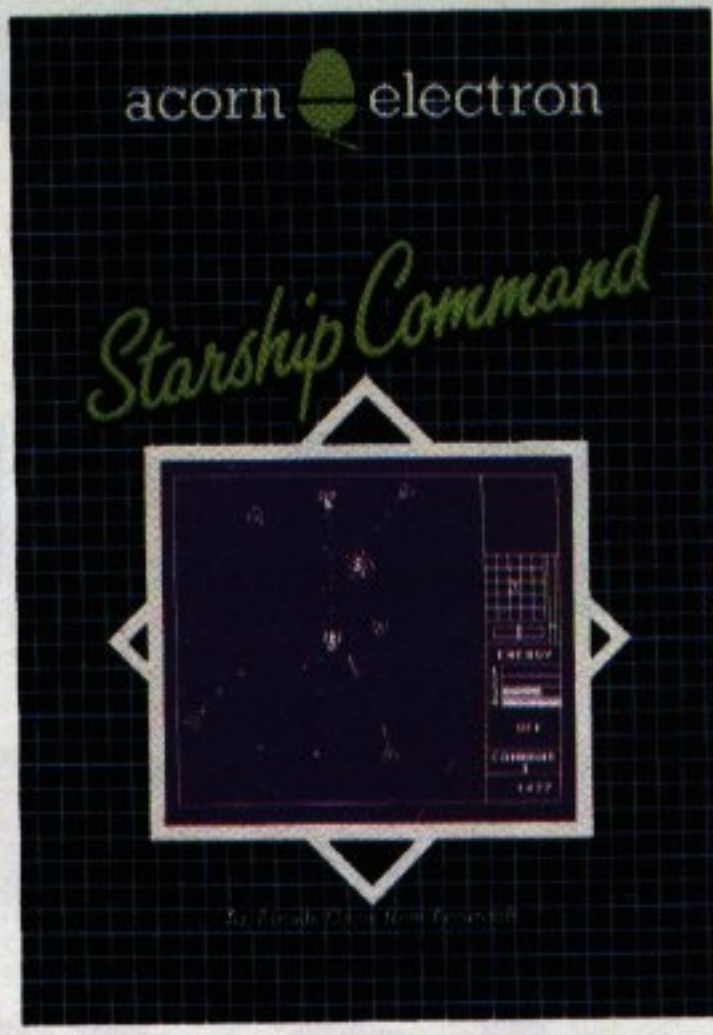
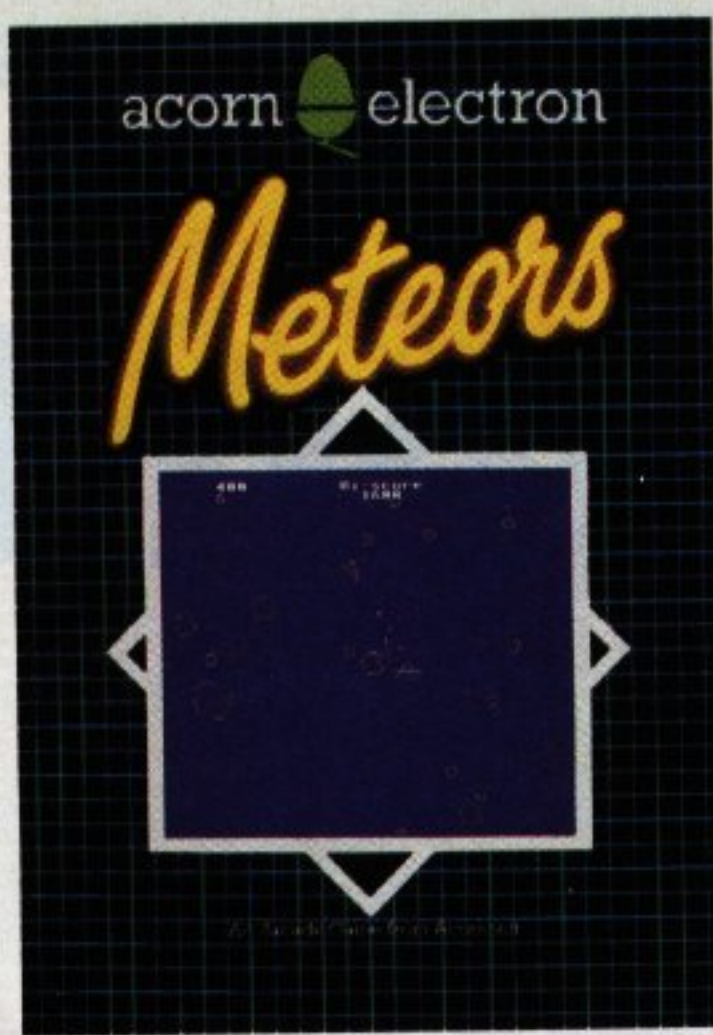
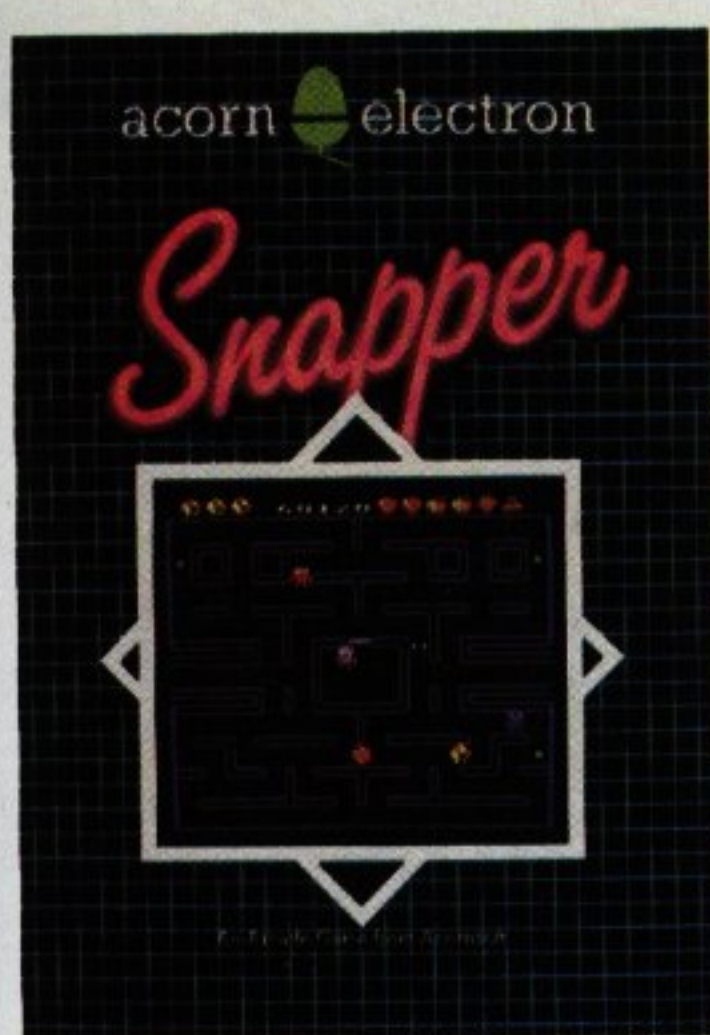
All of which will soon help familiarize you with the Electron and show you how to get the maximum enjoyment out of it straight from the word go.

Of course, we'll be constantly designing new software to help you fully realise the Electron's limitless potential.

You'll find all the programs featured here, plus the full



The Electron. The new boy from Acorn.



range of programs for the BBC Micro, available at selected W.H. Smith branches and at your local Acorn stockist. (To find out where they are call 01-200 0200.)

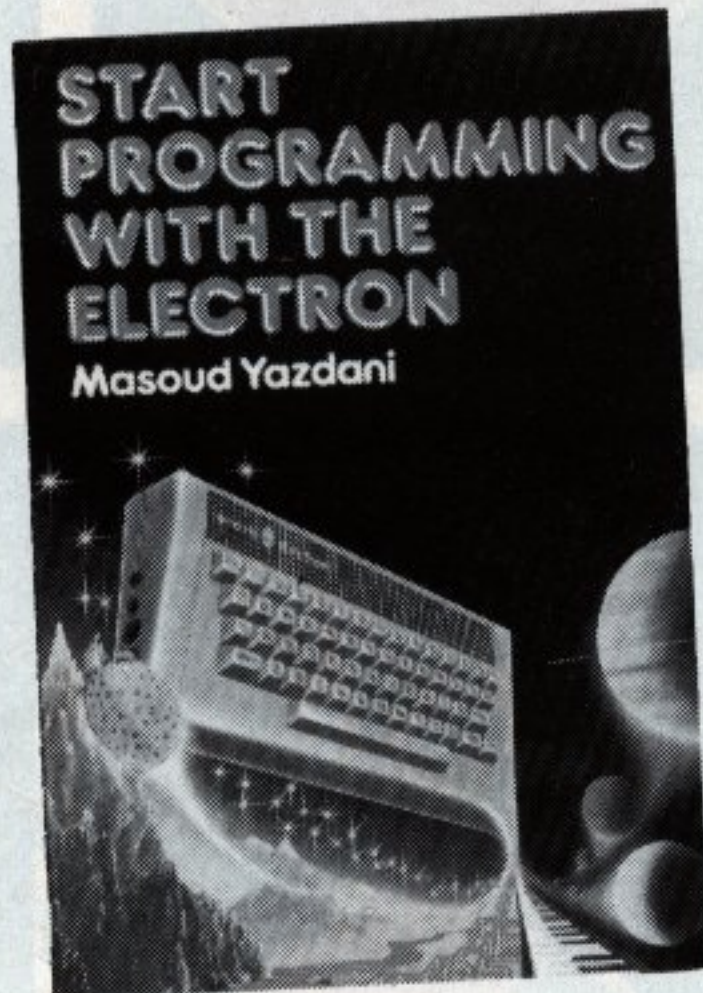
Alternatively, you can send off for the Acornsoft Electron or BBC Micro catalogue, by writing to:
Acornsoft, c/o Vector Marketing, Denington Estate,
Wellingborough, Northants
NN8 2RL.

ACORNSOFT

The friend that lets you down

THIS is the book that you'll find, along with the User Guide, in the box your Electron comes in.

You'll get some idea of its style from the blurb on the back which says: "This book



Start Programming with the Electron

Masoud Yazdani

is the friend you need to hold your hand through a bewildering new world".

However you can't judge a book by its cover, it's what's inside that counts. Sadly, it carries on using patronising phrases like "your journey through computer land".

This would be acceptable if the content made up for the style. But it doesn't.

It starts off with procedures in chapter one, goes on to functions and conditional branching in chapter two and eventually deals with INPUT in chapter seven.

On the way there is a detour into Turtle graphics

and the statement that machine code is "the jargon phrase for strings of noughts and ones".

During these wild lurches through computer land the level of presentation varies badly.

For instance, variables are explained well, yet the treatment of expressions is far too terse for a book aimed at beginners.

And the appearance of recursion in chapter one of such a book is mistaken, to say the least.

Acorn are to be congratulated for attempting to provide "a gentle introduction" to the Electron to supplement the User Guide.

Unfortunately this book fails to do so.

Peter Green

ASSEMBLING THE ABOUT MACHINE

FOR my money one of the nicest things about the Electron is its in-built assembler.

And now there's an equally nice book that teaches you how to use the assembler to talk to the micro in its own language - machine code.

People seem to shy away from assembly language, as it has a reputation for being hard to learn.

I've always maintained that it is more complex than difficult. If it were explained properly it wouldn't appear too formidable.

Now Ferguson and Shaw have made my point beautifully in the 13 chapters of "Assembly Language Programming on the Electron".

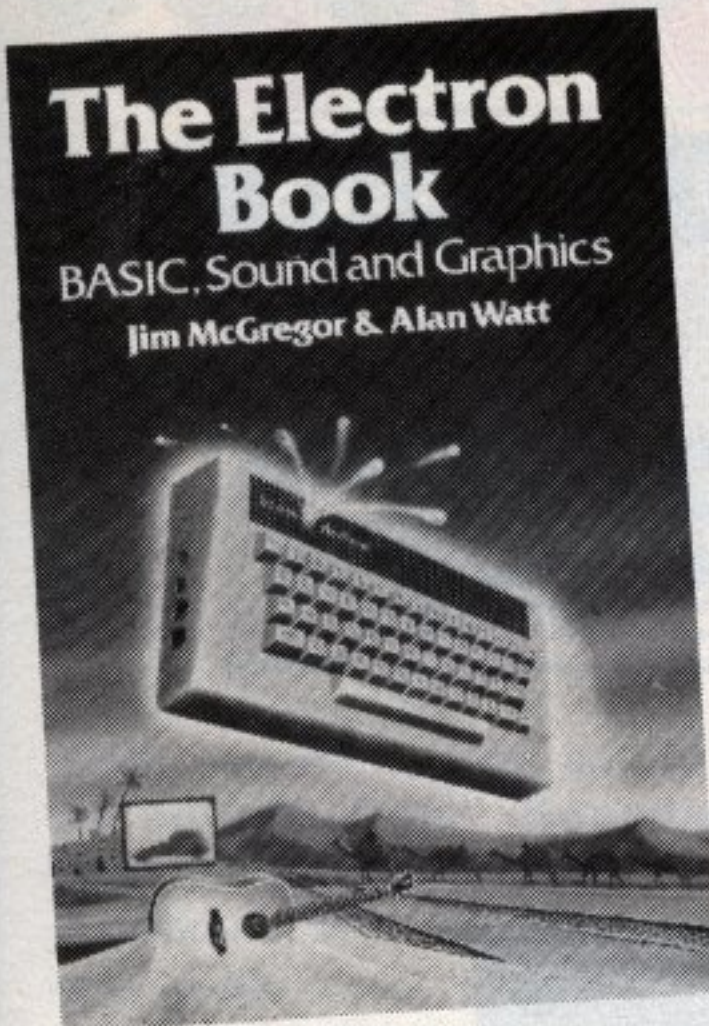
Each chapter is short and well illustrated, the diagrams

adding something to the text rather than just being decoration.

The numerous short example programs are excellent, and these, combined with the lucid treatment of the subject, soon give a feeling of confidence.

There are three short summaries for you to check your progress and eight appendices - which are, for

Brain strain won't be in vain



The Electron Book
Basic, Sound and Graphics
Jim McGregor & Alan Watt

I HAVE little doubt that before long there will be a series of books all about learning BBC Basic on the Electron.

I doubt very much indeed whether many of them will be as good as The Electron Book, by McGregor and Watt.

It is quite simply excellent, the best book on a micro that I've read for a long time.

The first seven chapters are an introduction to the joys and complexities of BBC Basic.

Structured programming is

introduced at an early stage, and the examples given are both illustrative and useful.

Each section is supported by a set of programming exercises which are an integral part of the book.

By the time you've worked through these you'll be able to program your Electron with ease and a fair measure of expertise.

The last four chapters deal with the Electron's sound and graphics capabilities – playing tunes from the keyboard, user defined graphics, animation. It's all there and more, dealt with expertly and thoroughly.

Not that it's an easy book to read. It assumes a certain amount of effort and intelli-

gence on the part of the reader.

If you're not prepared to do the exercises which are a vital part of the book then you might find the later sections hard going.

Having said that, the exercises are interesting in themselves. They illustrate and add to the text.

Any brain strain is well worth the effort!

Given the above and 10 useful appendices you can see why I'm so impressed with this work. It has set a standard by which other books on the Electron will be judged.

Impressive.

Graham Parr

FACTS CODE

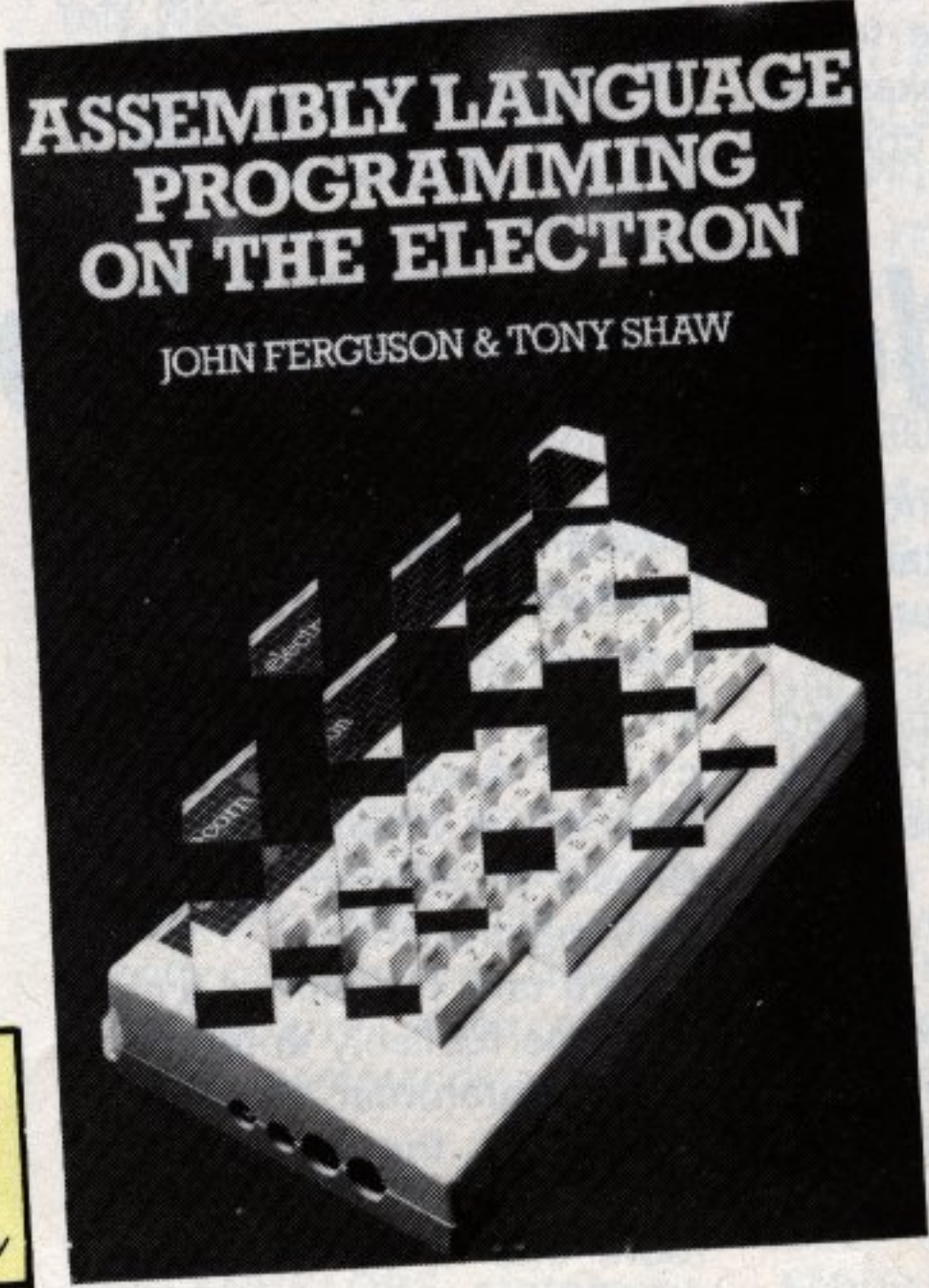
once, of use rather than just being afterthoughts.

This is a lovely little book. Its easy-to-read style and gradual progress give confidence to the learner while encouraging exploration.

So if you feel confined by Basic and want to know how to use your Electron's assembler, here's the one for you. A nice book.

Graham Parr

Assembly Language Programming on the Electron
John Ferguson & Tony Shaw



Software Surgery

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SWOOP

Program Power

HAVE you ever had one of those nightmares where horrible creatures swoop at you out of the sky? Try as you like, you can't get away from them.

With Program Power's exciting new game Swoop you get the chance to get your revenge using your Electron.

You do this by controlling a laser base at the bottom of the screen. The birdmen are hovering in formation at the top bombing you. Not content with that, they peel off and strafe you.

All you can do to escape is either to blast them with your laser or dodge out of the way by moving left or right.

Even if you do avoid them they still cause problems because on landing they lay eggs which turn into landmines. Run into these when you're dodging left and right and **BANG!**

Happily you do have three lives – and you need them! And if you manage to shoot enough of the birdmen the eggs they've laid fade away. The trouble is that as soon as you've shot down one formation another one takes its place. And they start coming

at you thick and fast.

It's a great game, enhanced by good graphics, nice sound effects and easily used controls. Fast and furious, it needs skill and good reactions to avoid the swarms that come at you as the game progresses. It's addictive – and a lot more fun than the nightmare.

Peter Bibby

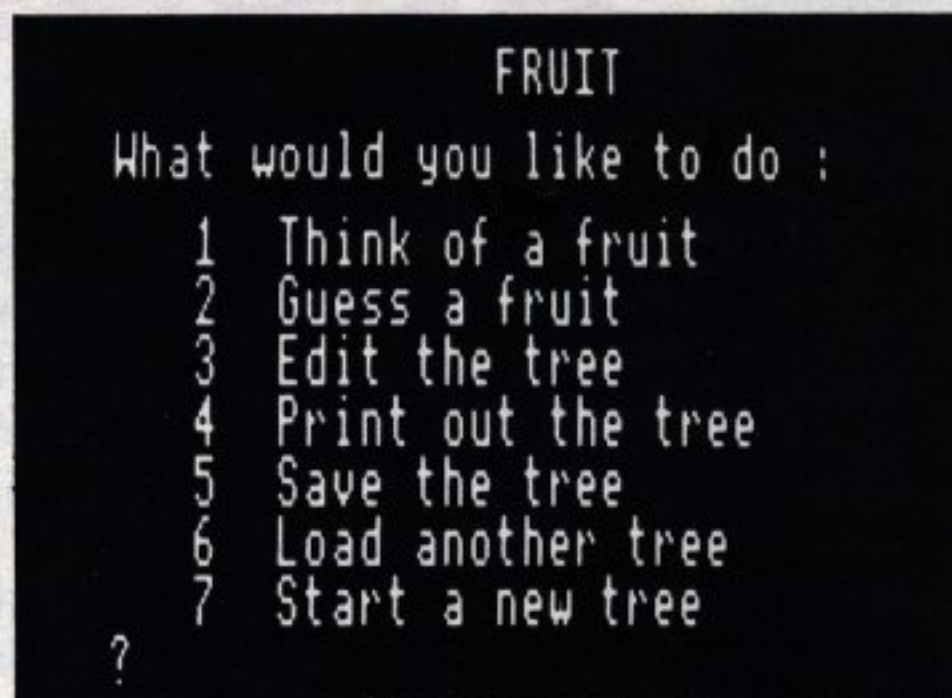
Education is an extra

TREE OF KNOWLEDGE

Acornsoft

SAYING that Tree of Knowledge, the new program from Acornsoft, is an educational game could be the kiss of death. I mean, who wants a game that's educational?

It sounds like an impossibility – a contradiction in



The main menu of Tree of Knowledge

terms! However, Tree of Knowledge is both.

It's a program that shows how computers can organise facts, which must be educational. But it makes it all so interesting that you don't realise you're involved in learning.

Taken at its simplest level it's just a question-and-answer guessing game. Either you decide to "be" an object and the Electron must guess what it is or the micro is "it"

and you must ask the questions until you can guess.

Of course, there has to be a list of objects to pick from, and the game supplies you with two.

On another level, you're learning how to set up lists of facts, or databases, and then using them to get the information that you want. At first, no doubt, you'll use the databases the game gives you but soon you'll want to create your own.

The program allows you to do this, simply and easily. It also lets you adjust the ones you already have, so you can throw in the odd unexpected object to catch out a know-it-all.

It's fascinating to use and can be anything from an intriguing game to an educational tool. The range is enormous. The Acornsoft cassette gives a database that can be used for A-Level biology students. I'm working on one using words from my daughter's school books. You're only limited by your imagination.

The instructions you get are complete and easy to follow and the whole package professionally produced.

If you're looking for a program that's both different and enjoyable then this is worth considering. Even if it is educational! Eileen Young

Shades of schooldays

HAVE you ever wondered what became of the grammar schools when the comprehensives came along?

Well I know what happened to one of them, Grunley Grammar. It was shut up, forgotten, and left to decay, the only inhabitants the ghosts of its old teachers.

These ghosts are doomed to spend all eternity teaching spectral classes the subjects they refused to learn in their lifetime.

They would far prefer to teach, test and taunt a living

THE GHOSTS OF GRUNLEY GRAMMAR

Magic Software

child. And with Magic Software's cassette, The Ghosts of Grunley Grammar, they get the chance.

You take the part of a child who has foolishly entered the ghastly grammar school and fallen into the hands of its ghosts. You go from room to room and in each room the spirit of a master asks you three questions on his subject.

Should you fail any of them he gloatingly tells you the answer and back to the beginning you go. But only

after the ghosts have taunted you about your stupidity!

It's amusing and becomes compulsive. All the usual school subjects are covered and there's a fair selection of questions. It's the kind of game that kids love – not just playing it themselves but also watching others make mistakes and get insulted. And they're learning all the time.

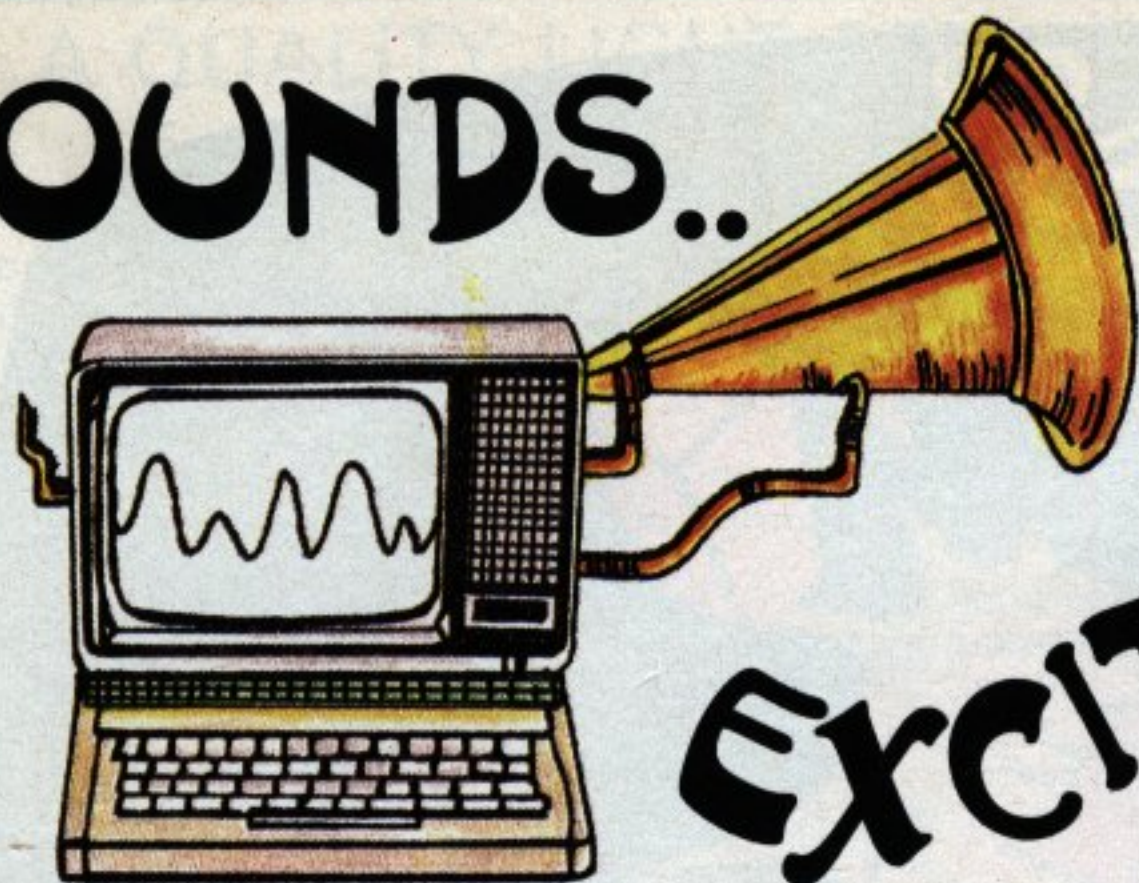
The program is fun and original. No doubt educationalists will say that it just teaches facts, not understanding, but that's just a quibble.

The program is amusing and addictive. In fact it's magic.

Trevor Roberts



SOUNDS..



Exciting

HAVE you tried using any of the sounds from "Sounds Exciting" yet? If you haven't, you should. It's fun and quite easy to do.

Let's take the factory sound from the second issue of *Electron User*.

Under the picture of the hammer and the machinery you have:

```
SOUND 0,1,1,50
ENVELOPE 1,5,1,20,8,200,0,0,
126,0,0,-126,126,126
```

To make the sound all you have to do is to type these letters and figures into your Electron. Don't forget to press Return!

The SOUND command and the figures following it tell the micro to make the noise. The ENVELOPE command with its attendant figures controls the type of noise made by the SOUND command.

One thing to make clear is that the ENVELOPE statement must be typed in before you type in the SOUND statement. This is fairly logical if you think about it, because for ENVELOPE to modify SOUND it must come before it.

Putting in the SOUND

before the micro has been told which ENVELOPE to use just results in a puzzling silence.

Happily once you've entered the ENVELOPE statement the Electron will remember it and use it to modify the SOUND statement whenever it is used. However, don't expect it to be remembered after you've switched off!

You can also use the commands in a program but remember that there must be an ENVELOPE statement before you can use the SOUND command to make a noise.

Suppose we want to use the wailing bugs sound effect from issue one. All we do is put them in our program by giving them line numbers such as:

```
10 ENVELOPE 4,4,-1,1,0,20,20,
0,126,0,0,-126,126,126
20 SOUND 1,4,200,100
```

Notice that the ENVELOPE statement comes first. After this, however, you can use the SOUND command and it will automatically refer back to the correct ENVELOPE. You needn't use it again.

It can do this because each SOUND command is linked to its ENVELOPE by a label. The label is the number that comes

SWALLOWED IN ONE GULP!

```
ENVELOPE 1,1,43,0,0,100,0,0,
126,0,0,-126,126,126
SOUND 1,1,17,18
```



```
ENVELOPE 1,6,126,0,0,206,
0,0,126,0,0,-126,126,126
SOUND 1,1,100,200
```



HAR~HAR!

immediately after the ENVELOPE command.

In the factory sound the number is 1, in the wailing bugs it is 4. You can have up to 16 ENVELOPES labelled in this way.

When the Electron comes across a SOUND command it checks to see whether there is an ENVELOPE label attached. This is the number that follows the first comma in the SOUND statement. It's 2 in the case of the factory noise, 4 for the wailing bugs. The micro then obeys the SOUND command but modifies the noise it makes by using the ENVELOPE with the same number.

Try the program on the right which contains the two ENVELOPE statements we've already come across. They are used to alter each of the SOUND commands we met earlier.

The wailing bugs SOUND command is modified by its own ENVELOPE statement and then by that of the factory sounds. Then the factory sound is modified by each of the ENVELOPE statements in turn.

```
10 ENVELOPE 4,4,-1,1,0,
20,20,0,126,0,0,-126,
126,126
20 ENVELOPE 1,5,1,20,8,
200,0,0,126,0,0,-126,
126,126
```

```
30 CLS
40 PRINT "PRESS A LETTER
KEY" "FOR THE NEXT SOUND
"
```

```
50 A$=GET$
60 SOUND 1,4,200,100
70 A$=GET$
80 SOUND 1,1,200,100
90 A$=GET$
100 SOUND 0,1,1,50
110 A$=GET$
120 SOUND 0,4,1,50
```

All we've done is to change the labels on the SOUND commands so that they use both ENVELOPE statements.

By swapping the labels in the SOUND commands you can use any of the ENVELOPES we've given you with any of the SOUNDS – sometimes with surprising results!

It's up to you and your Electron. Sounds exciting!

CAR STARTING

```
ENVELOPE 1,1,3,0,0,7,7,0,126,
0,0,-126,126,126
SOUND 0,1,63,84
```



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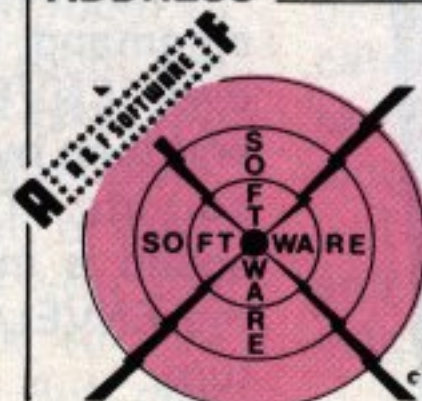
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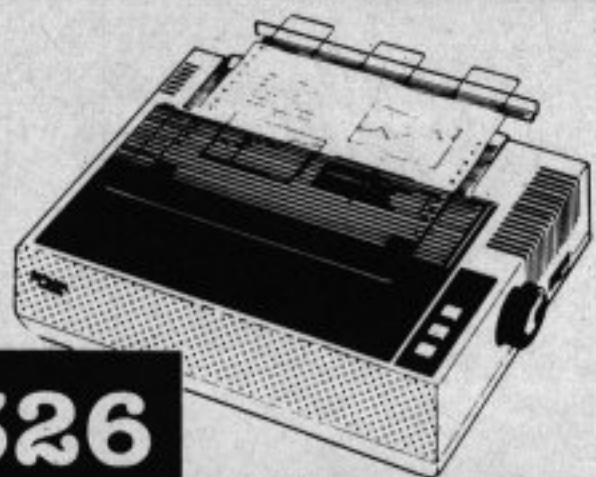


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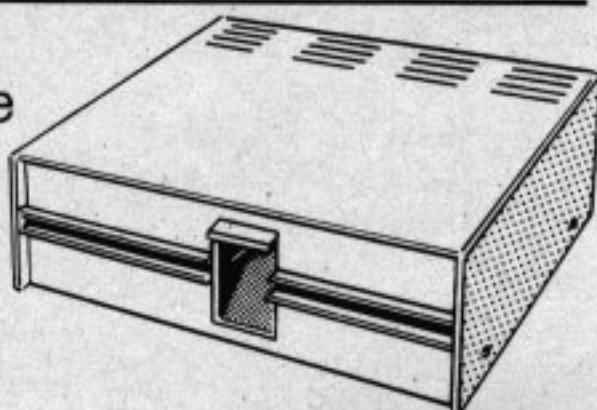
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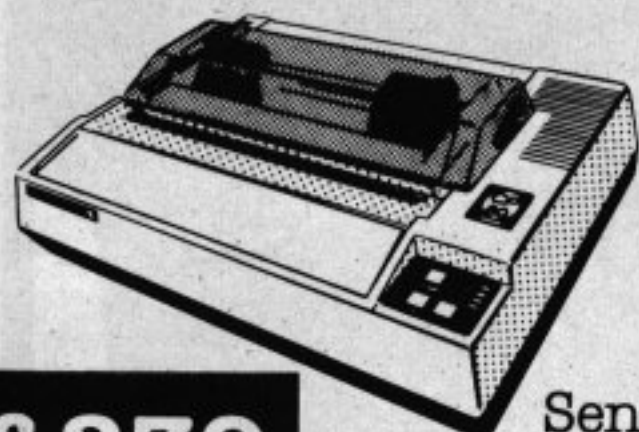
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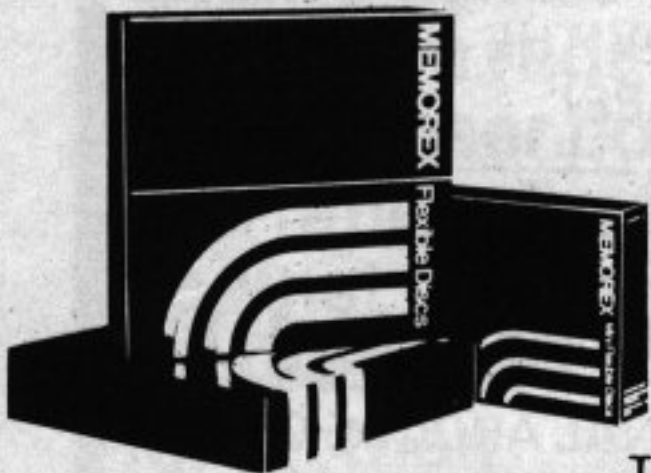
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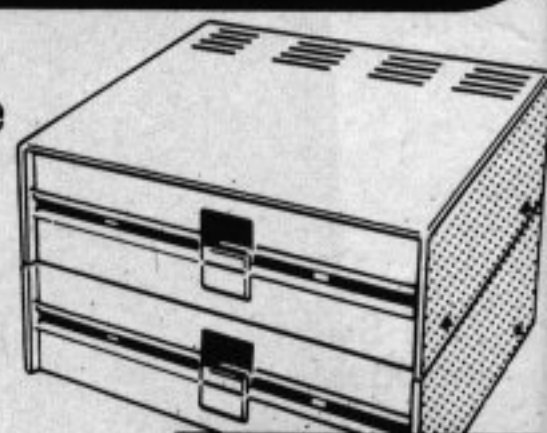
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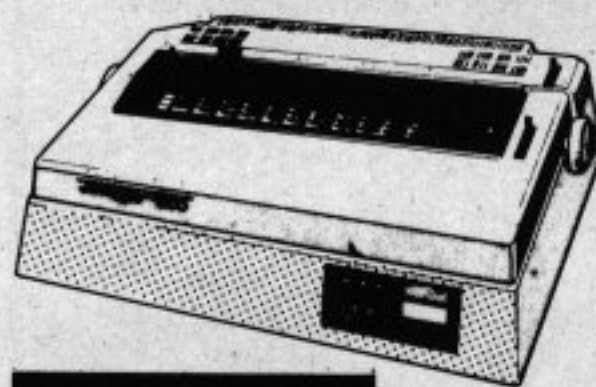
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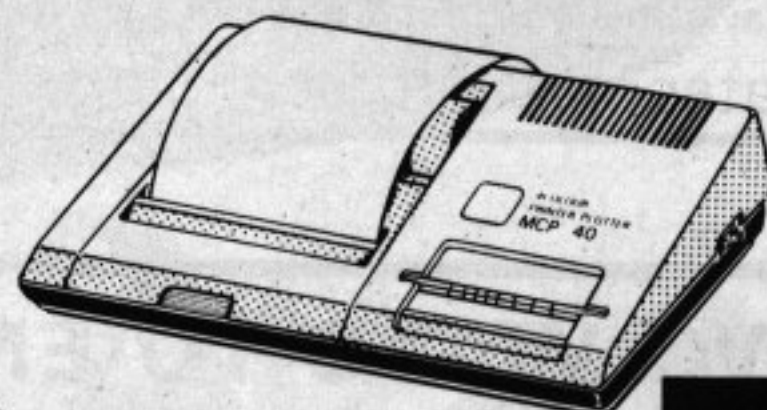


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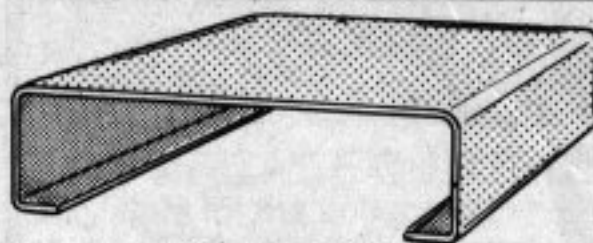
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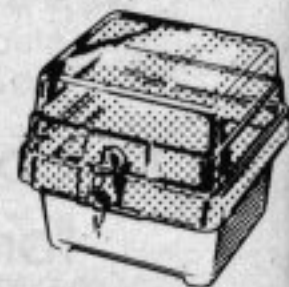
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We continue the invasion this month with our latest and most exciting release yet. Have you the courage to enter the VORTEX? — You'll need all your senses and co-ordination tuned to perfection to avoid being fragmented by asteroid storms or vaporized by aliens. Each second you remain intact, your velocity will continue to increase as the vortex draws both you and all the surrounding debris into it's clutches. The point is inevitably reached where even your super human reactions are too slow to avoid collisions with asteroids, and your ship is destroyed with a blinding flash and a cascade of radioactive particles. This is definitely our best game yet, from the author who created Gunsmoke, 3D Bomb Alley and Attack on Alpha Centauri. VORTEX uses keyboard or joysticks, with the option of sound effects and a pause control. (Seat belts recommended but not included!) The true three dimensional illusion will captivate your senses, as you come face to face with the VORTEX. A 3D space voyage for the BBC micro model B for just £7.95 on cassette or £11.95 on disc.

Other programs available for the BBC Micro Model B:- Cassette £7.95 inc. Disc £11.95 inc.

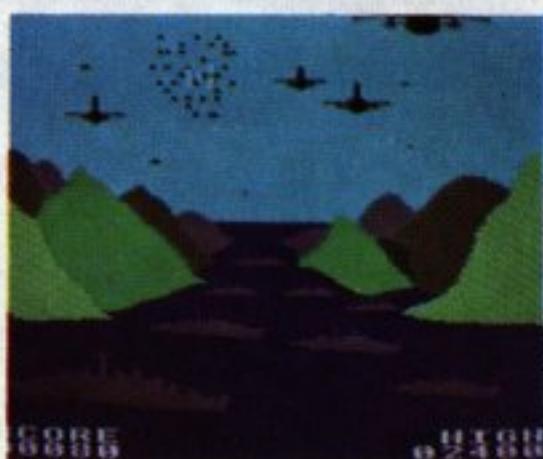
GUNSMOKE



"... the graphics are excellent and the whole thing well designed."
... "a game for the family — simple, but enjoyable"

THE MICRO USER

3D BOMB ALLEY



"This is a very addictive game and is good value for money"

BEEBUG

ATTACK ON ALPHA CENTAURI



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BEEBUG

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The *Micro User* and *Electron User* wish you all a Happy Christmas with our musical Christmas card program which comes courtesy of 14-year-old Linda Stonebanks.

Type it in before your Christmas pudding or you might not be up to it!

Let Santa Linda deliver your Christmas cards



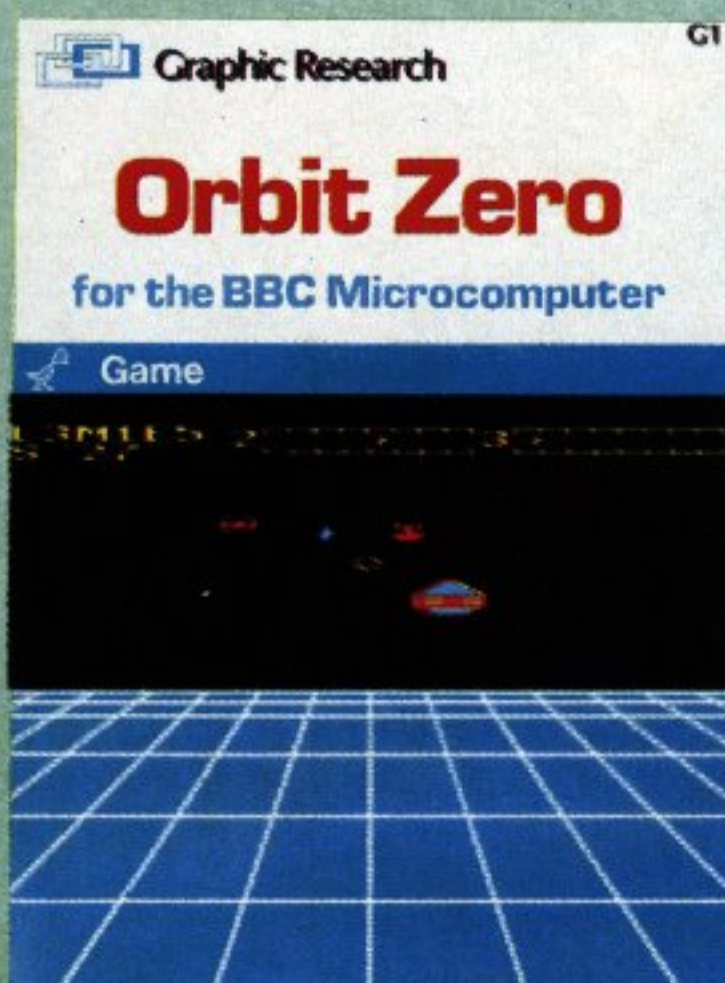
```

10 REM *****
   *****
20 REM *** A CHRISTMAS
   CARD ***
30 REM *** by Linda Stoneb
   anks ***
40 REM *** C The Micro
   User ***
50 REM *****
   *****
60 *KEYOMODE0:IMVDU14:ML:IM
80 VDU 23;11,0;0;0;0;
   :REM DELETE CURSOR
90 VDU 23,224,24,24,24
   ,24,24,24,24,24
100 VDU 23,225,8,28,62
   ,62,62,62,28,8
110 VDU 23,226,0,0,0,24
   ,24,0,0,0
120 VDU 23,227,0,24,36
   ,66,66,36,24,0
130 VDU 23,228,&66,&81
   ,&81,0,0,&81,&81,&66
140 ON ERROR VDU 14
   :VDU 20
   :REPORT
   :PRINT " at line ";
   ERL ,
   :STOP
150 ENVELOPE 1,6,0,0,0
   ,3,16,16,125,-5,-15
   ,-15,126,60
160 MODE 2
   :octave$="cCdDefFqGaAb"
   :REM CAPS=# (C=c sharp)
170 FOR hsize=5 TO 70
   STEP 15
180 vsize=hsize
190 CLS
   :PROctree(640,512)
   :PROCdelay(50)
200 NEXT hsize
210 FOR hsize=15 TO 95
   STEP 15
220 FOR vsize=5 TO 65
   STEP 15
230 CLS
   :PROctree(640,512)
   :PROCdelay(50)
240 NEXT vsize
250 NEXT hsize
260 CLS
270 hsize=13
   :vsize=13
280 FOR X=160 TO 1200
   STEP 320
290 FOR Y=100 TO 900
   STEP 200
300 PROCmusic
   :PROctree(X,Y)
310 NEXT Y
320 NEXT X
330 PROCdelay(150)
   :CLS
340 hsize=50
   :vsize=55
350 PROCtree(640,550)
360 PROCtrunk(-1,1,-4
   ,-3)
370 PROCballs
380
390
400 VDU 29,0,0
   :colour1=0
   :colour2=1
410 FOR X=0 TO 1279
   STEP 16
420 PROCmusic
430 FOR Y=0 TO 64 STEP 8
440 GCOL 0,colour1
   :PLOT 69,X,Y
   :PLOT 69,X+8,Y+4
   :REM BOTTOM LINE
450 PLOT 69,X,Y+955
   :PLOT 69,X+8,Y+959
   :REM TOP LINE
460 GCOL 0,colour2
   :PLOT 69,X+8,Y
   :PLOT 69,X,Y+4
470 PLOT 69,X+8,Y+955
   :PLOT 69,X,Y+959
480 NEXT
490 colour1=colour1+1
   :IF colour1=8
   THEN colour1=0
   :colour2=colour2+1
   :IF colour2=8
   THEN colour2=colour1
500 NEXT
510
520
530 VDU 29,0,0
   :colour1=0
   :colour2=1
540 FOR Y=72 TO 953
   STEP 8
550 PROCmusic
560 FOR X=0 TO 128
   STEP 16
570 GCOL 0,colour1
   :PLOT 69,X,Y
   :PLOT 69,X+8,Y+4
   :REM LEFT
580 PLOT 69,X+1143,Y
   :PLOT 69,X+1151,Y+4
   :REM RIGHT
590 GCOL 0,colour2
   :PLOT 69,X+8,Y

```

Turn to Page 121

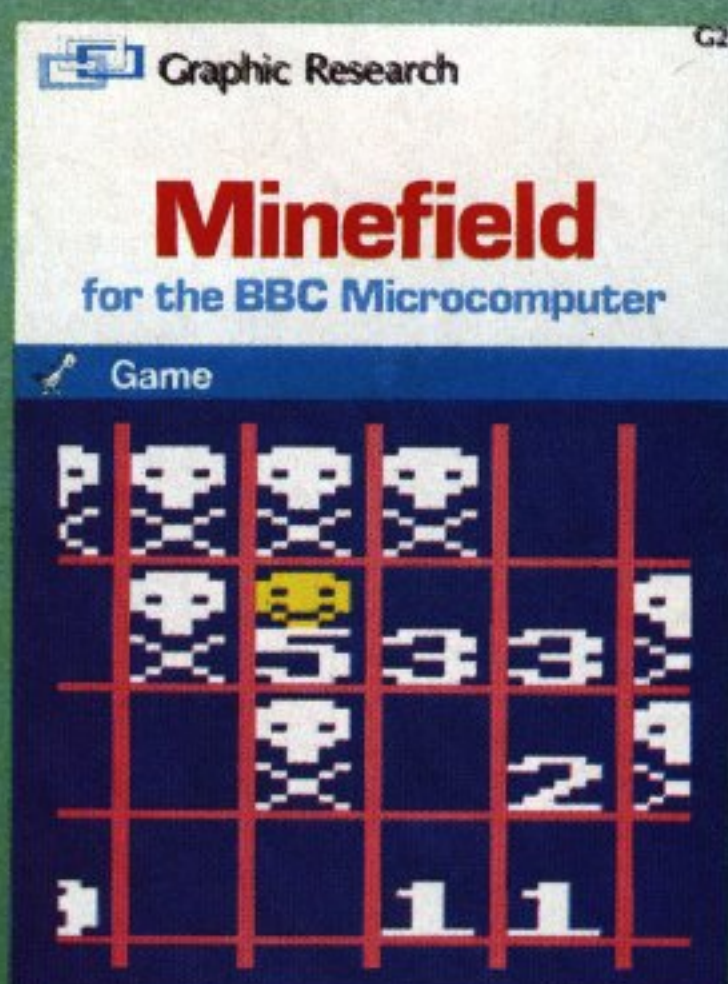
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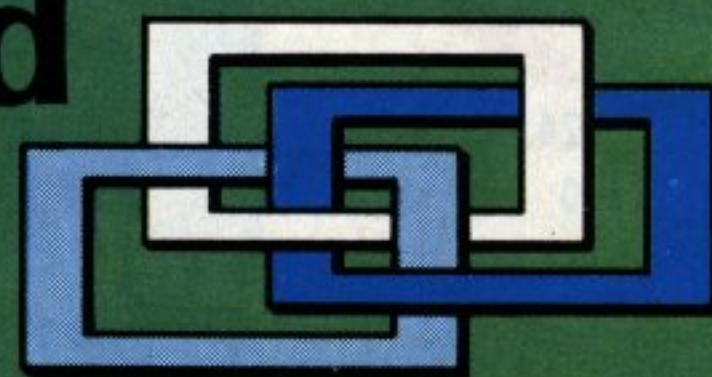
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THE Editor crept up behind me as I was finishing Peters' First Concerto for BBC Micro (with optional disc drive accompaniment). The first I knew of it was when he pressed Break and started cackling as he saw the look on my face.

"Cheer up", he crowed, "you're taking all this sound and music too seriously. It's getting out of proportion".

"In fact", he added, "you should keep it all in scale".

He reached his office before I reached him.

Not top of the pops perhaps, but try playing this

**By
NIGEL PETERS**

SURPRISINGLY he was more accurate than he thought because this month we'll be covering musical scales. Not that I intend to give you a music lesson — I wouldn't dare — but I will show you the basics of producing simple tunes with your micro.

In the last article we examined the SOUND command and learned how to use it to produce noises. Each of these separate noises is technically called a note and by putting together a series of notes we get a tune.

It should be pointed out that some series of notes are more tuneful than others — as you may have found with the random music generator!

This is because the human ear has come to expect a certain consistency in the notes that make up tunes.

It wants them to go up and down, or change pitch, by regular amounts.

```
10 REM PROGRAM I
20 FOR pitch=0 TO 255 STEP 4
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

Program I

```
10 REM PROGRAM II
20 FOR pitch=0 TO 255 STEP 1
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

Program II

```
10 REM PROGRAM III
20 FOR pitch=0 TO 255 STEP 8
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

Program III

```
10 REM PROGRAM IV
20 pitch=50
30 REPEAT
40 SOUND 1,-15,pitch,20
50 READ increase
60 pitch=pitch+increase
70 UNTIL increase=0
80 DATA 8,8,4,8,8,8,4,0
```

Program IV

```
10 REM PROGRAM V
20 REPEAT
30 READ note
40 IF note=0
   THEN END
50 SOUND 1,-15,note,10
60 UNTIL FALSE
70 DATA 30,30,38,26,30,38,0
```

Program V

Try running Program I.

This goes upwards in a series of steps called semitones. It does this by adding four to the pitch parameter of the SOUND command each time round the loop.

These semitones are the natural building blocks of western music. When tunes go up and down in pitch (higher or lower, soprano or bass) they tend to do so in semitones or groups of semitones.

Even though Program I will probably have you pressing Escape before its end, you'll find it a lot more acceptable than Program II which goes up in steps of one, a quarter of a semitone.

Since we've been talking about semitones you might expect that we'll be coming to whole tones and this we do with Program III.

This program plays a series of notes, each successive note being raised in pitch by one tone (or two semitones). So

increasing the pitch parameter by four raises the note by a semitone; increasing it by eight produces a note one whole tone higher.

Higher notes require different combinations of four and eight to be added to the pitch parameter.

The trouble with the previous programs is that although they worked in tones and semitones, the natural building blocks of music, they were boring.

They leave you with that "waiting for the other boot" feeling!

This is because our ears not only expect tunes to be composed of notes which vary in pitch by tones and semitones, but also they prefer certain selections of the available notes. Try running Program IV.

Much more satisfying, isn't it? It has a complete feeling about it.

After the first note is played the following notes are increased in pitch by the amounts shown in the DATA statement.

As you'll expect by now, these

SYSTEM SOFTWARE

```

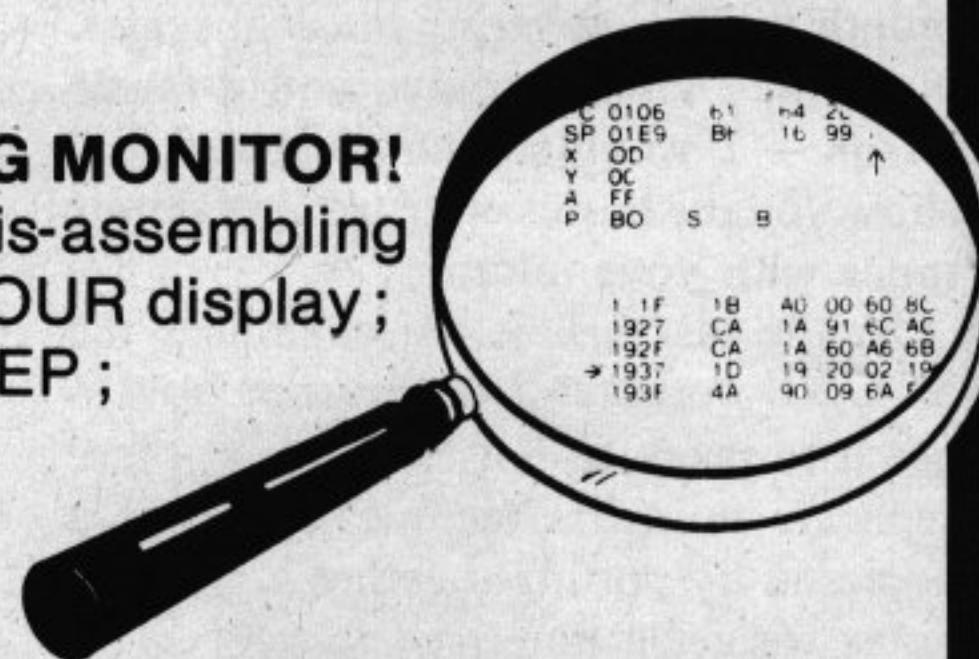
AS8LINE      Assembler #3501                               Page 19

IF20:00      115      LDA      ;
IF20:0100     116      LDA      ;TEMP1,1
IF20:1      117      FMA4      ; and # 1
IF20:0500     118      PECTOR LDA      ;
IF20:0A00     119      LDA      ;SRAV
IF21:0A00     120      LDA      ;SRAV
IF22:00      121      RPS      ;
IF24:         122      ;
IF24:00740F   123      DEC2  JSR      DEC2
IF24:00741F   124      JSR      DEC2
IF24:0E00     125      DEC2  INC      TEMP1
IF24:0E00     126      RPS      # 4
IF26:0E00     127      INC      TEMP2
IF44:0100     128      LDA      ;TEMP1,1
IF42:00      129      FTS      ;
IF43:         130      ;
IF43:00741F   131      DECN  JSR      DEC2
IF43:0E000F   132      JSR      RESLOF
IF49:0E000000  133      JMI      ;TEMP1
IF4C:         134      ;
IF4C:         135      ;
IF4C:         136      ## nisp, space ##
IF4C:         137      ;
IF4C:00E01E   138      SJIF  JSR      SGOIT
IF4F:00F0     139      RCO      ;
IF51:00A0     140      BNE      DIDIT
IF52:         141      ;
IF52:         142      ;
IF52:         143      *****
IF52:         144      *****
IF52:         145      *****
IF52:         146      *****
IF52:         147      *****
IF52:         148      *****
IF52:00C0F    149      SYM1  DEL      INDE+
IF52:00C0F    150      JSR      SYM1
IF52:         151      ;
IF52:         152      *****
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From Page 83

increments are all fours and eights, but they are in an order that sounds pleasing to the ear.

This is known as a scale, and most tunes are made up of combinations of notes picked from one scale.

To recap, nearly all the tunes you know consist of series of notes whose pitch changes in multiples of tones and semitones. The notes go up and down in discrete bundles made up of these measures and most tunes confine themselves to a selection of the available notes.

What this means for the BBC Micro is that if you're trying to write a tune you know that after you've picked the start note all the other notes will have the start note's pitch parameter varied by factors of four or eight.

Of course the channel, loudness and duration of the note may vary as well but in this article let's concentrate on the pitch.

It's much easier to use in practice

than to describe. Try running Program V.

This produces a fairly uninspiring version of a well-known tune. It's hardly wonderful music but you can see from the DATA statement how the pitch parameter of the notes varies by factors of four or eight from the pitch parameter of the first note.

Once I had the first note it was just a matter of figuring out whether the next note was up or down and adding or subtracting the fours and eights as necessary.

Then I just put them in a DATA statement and let the loop read the pitch and play the tune.

You can play your own tunes by putting in your own DATA statements. The problem is that you have to figure out which DATA statements produce which notes. Program VI will help you with this.

It is a very simple one which allows you to write micro music by ear.

It begins by asking you for the pitch and duration parameters of the tune's

first note. The micro then plays this and asks you if you want to keep it.

If you do, it will save the note and ask you if you want to play the tune. The program carries on like this, asking for the parameters of notes, playing them and, if required, saving them.

When you finally decide to hear the tune it will play it and display the DATA statement values used.

It's simple to write tunes using this program. When you want to play them just modify PROCreadnote and PROCplaystring.

Of course, this has been a fairly limited treatment. Only one of the BBC Micro's four channels has been used, and we haven't varied the loudness at all. Also we've avoided playing more than one note at a time and producing harmonies.

All this, and more, will follow. But I have to finish now. I've been working for far too long for too little pay, so I'm going into the Editor's office, waking him up and demanding a raise.

I call it making my pitch.

```

10 REM PROGRAM VI
20 counter=1
30 PROCnote
40 PRINT
   :PRINT
50 PRINT "Data Statements:"
60 PRINT
   :PRINT
70 PRINT tune$
80 END
90 DEF PROCTune
100 REPEAT
110 PROCreadnote
120 PROCplaystring
130 UNTIL counter>=LEN (tune$)
140 ENDPROC
150 DEF PROCnote
160 CLS
170 INPUT "Pitch of note?"pitch
180 PRINT
   :PRINT
190 INPUT "Duration of note?"duration
200 PRINT
   :PRINT
210 SOUND 1,-15,pitch,duration
220 PRINT
   :PRINT
   :PRINT
230 PROCkeepnote

240 ENDPROC
250 DEF PROCkeepnote
260 PRINT "Keep this note?"
270 PRINT "Press Y and Return for
   YES"
280 PRINT "Any letter and Return
   for NO"
290 PRINT
   :PRINT
300 INPUT key$

310 IF key$="Y" OR key$="y"
   THEN PROCstring
   ELSE PROCnote
320 ENDPROC
330 DEF PROCstring
340 tune$=tune$+STR$ (pitch)+","
   +STR$ (duration)+","
350 CLS
360 PRINT "Play the tune now?"
370 PRINT
   :PRINT
380 PRINT "Press Y and Return for
   YES"
390 PRINT "Any other letter and Retur
   n for NO"
400 INPUT key$
410 IF key$="Y" OR key$="y"
   THEN PROCTune

   ELSE PROCnote
420 ENDPROC

430 DEF PROCplaystring
440 pitch=VAL (pitch$)
450 duration=VAL (duration$)
460 SOUND 1,-15,pitch,duration
470 SOUND 1,0,pitch,0
480 ENDPROC
490 DEF PROCreadnote
500 pitch$=""
510 REPEAT
520 IF MID$(tune$,counter,1)<>","
   THEN pitch$=pitch$+MID$(tune$
   ,counter,1)
530 counter=counter+1
540 UNTIL MID$(tune$,counter-1,1)=
   ","
550 duration$=""
560 REPEAT
570 IF MID$(tune$,counter,1)<>","
   THEN duration$=duration$+
   MID$(tune$,counter,1)
580 counter=counter+1
590 UNTIL MID$(tune$,counter-1,1)=
   ","
600 ENDPROC

```


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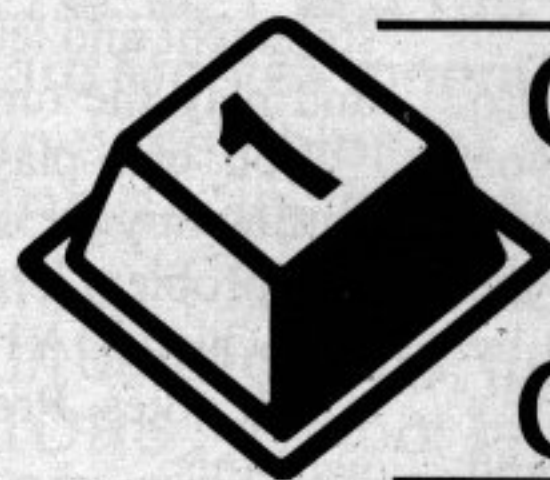
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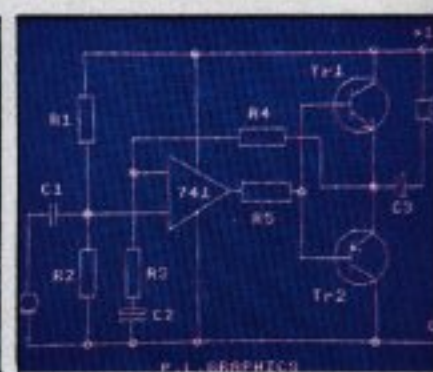
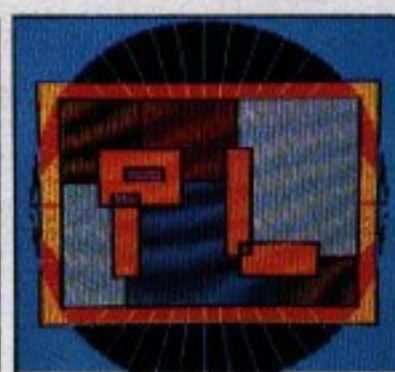
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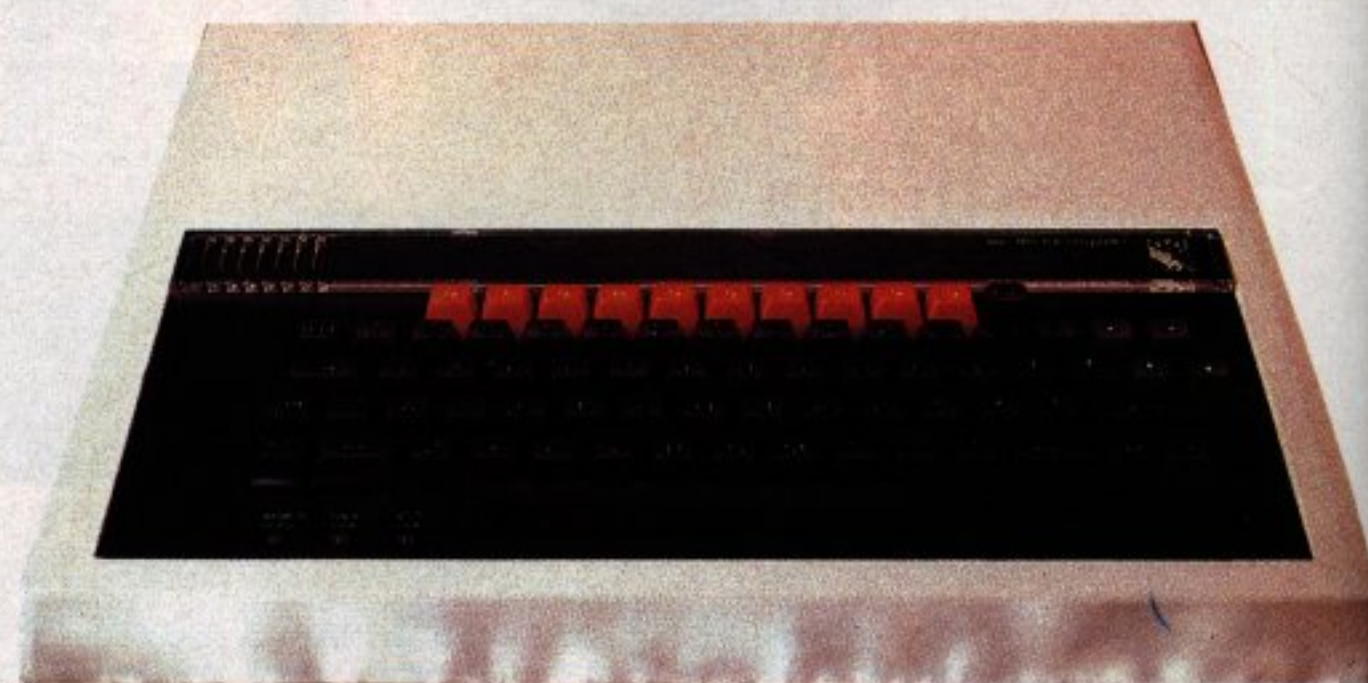
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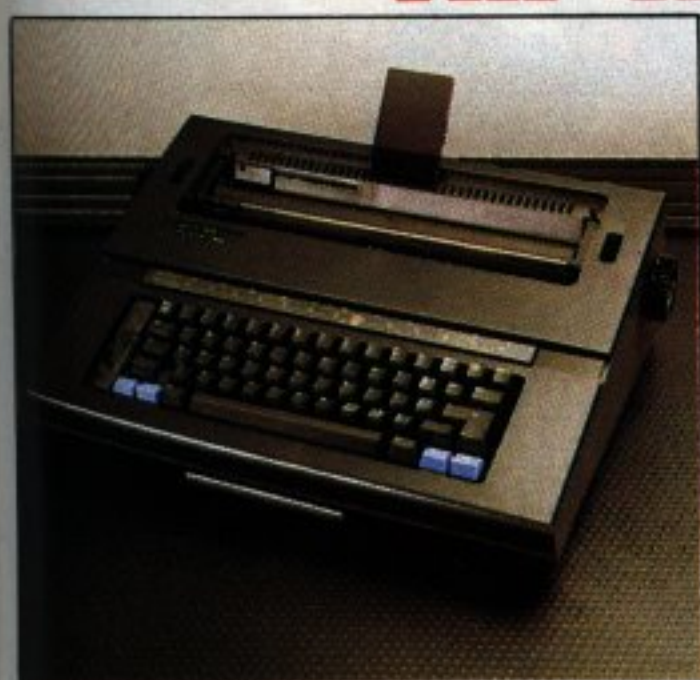
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Eight socket ROM board.
Smartmouth speech synthesiser
Both from Technomatics

A ROM extension board gives you the chance to add more than the four possible language or utility ROMs to your BBC Micro. For example, I have Beebcalc, Wordwise, CPN, Basic and the Watford DFS chips.

There are ROMs available with Pascal, Logo, print and disc editing utilities. And I hope more will follow. Certainly the BBC Micro becomes very powerful with so much software only a * command away!

ROM extension boards are not easy to fit. Acorn have not socketed the relevant chips (IC76 and IC20) and one must either desolder the chip and put a socket on the board, or solder leads directly to the chips.

Though able to be done by a competent technician, my advice is that this is a job for your dealer. The BBC board is delicate, the chips close together and mistakes difficult to rectify.

There is another problem. Not all BBCs decode these ROMs in the same way. In theory, the most right hand ROM socket has the highest priority

and as you progress towards the 0.1 or 1.2 OS ROM, the priority gets less.

This was certainly not the case on my board. The ROM socket furthest to the right had the highest priority, but after that it was a little strange. Things were made worse when I fitted the ROM extension board.

This is important because different ROMs can take priority over each other and must sit in the right priority socket. For instance, if you have two DFS chips fitted it is the highest priority DFS that handles all default filing and so on.

If, like me, you have the CPN ROM but usually want Basic first, then the priority order must reflect your wishes.

The highest priority is ROM 15. You can detect which ROM socket your machine thinks it is accessing by the following:

Type into the machine:
*FX 252,0
Return
Break

Then reset the machine with CTRL + Break and change the 0 after the comma to another number from one to 15. Repeat this until you have tracked your ROMs.

When you press Break after the *FX 252 call, the machine "bombs" into the ROM whose number you have specified.

The Technomatics board slots into the most right hand ROM position. It sits just under the keyboard and across the top of the under-board connectors. Thus it can keep as cool as possible.

Other extension boards tend to move into the heart of the micro and can get very hot indeed, which may cause problems later.

The board is well made, adequately insulated from any other electrical components with some of the best quality sockets I have found on a low cost commercial board. This is important if you are continually going to take ROMs in and out of your sockets.

The board has been sitting in my micro for a month now. After the initial pangs of fitting, it has performed well. But along with the Z80 card and other additions, my BBC Micro can get quite hot. This has led to inadequacies in the 6522 chip servicing the keyboard being shown up.

I understand this may be a far more common problem than yet has come to light. After a few hours of operation either the keyboard will not respond or certain keys behave strangely. Like all good bugs it is rare, random and a devil to trace.

If you do fit additional boards then be aware that, though the BBC power supply is more than adequate, some chips on the board are very sensitive to temperature. You may think that your micro is cool – but it isn't!

It will be a difficult choice between the Technomatics and Watford extension boards. On "pence per ROM" Watford wins, but your board is more likely to heat up.

I prefer to play it safer with the Technomatics board. The choice is yours.

Ian Murray

Software only an asterisk away

SMARTMOUTH'S NO SWEET TALKER

SMARTMOUTH is an implementation of the allophone technique for speech synthesis.

It produces speech by accessing individual sounds, and words are built up by voicing these in quick succession. It is thus not necessary to know how a word is spelled but how it sounds!

You can then build up the word phonetically using one allophone after another.

Smartmouth comes in a small plastic box with an inbuilt speaker. There is also an audio output for connection to an amplifier if required. It attaches externally to the BBC Micro, power and data being supplied from the micro via the user port. There are two programs on cassette and a six page manual to help you master its working.

The programs consist of a development aid and a demonstration of its use.

The manual has a table of the 64 allophones provided, some hints on how to get the best out of the unit, instructions on how to access the unit from a program and a single page of examples. This is very helpful though it would have been useful to have more examples supplied.

The speech from this unit is understandable but not of the same quality as from the Acorn speech ROM. The voice lacks any intonation and really sounds like a computer. It is, however, very easy to produce new words once you get used to what the allophones sounds like.

It is also worth remembering that even a lengthy word such as "synthesiser" can be formed in only 11 bytes so memory overheads are negligible.

Paul Taylor

Make your Micro the life and soul of the party

WITH the festive season once more upon us, here is a little add-on that will make your BBC Micro a welcome guest at any party. As well as being available in kit form, it can also be purchased ready-built for the less intrepid among you.

It is a little-known fact that I used to be a disc jockey in my early youth. The truth of the matter was that I enjoyed wiring up all the amplifiers, turntables and tape decks.

Such was the mess of wiring spaghetti that I was the only one who would dare operate it. It also fell to my lot to wire up the disco lights and to flash them on and off. This was in the Dark Ages when such a thing was a novelty.

However, the control of disco lights was one of the first things I automated. A natural progression was to make the music control the switching of the lights.

When lights are fixed, the results produced do not get very complicated, but the overall effect adds great atmosphere to any party.

I have always had the feeling that something better could be done and for a long time have wanted to do something similar with a computer.

However, not until the advent of the BBC Micro has a computer incorporated sufficient facilities to make this project worthwhile.

This month's exercise is therefore an add-on which produces patterns related to music or, if you have built the solid state relay (see the September issue of the Micro User), controls conventional spot lights.

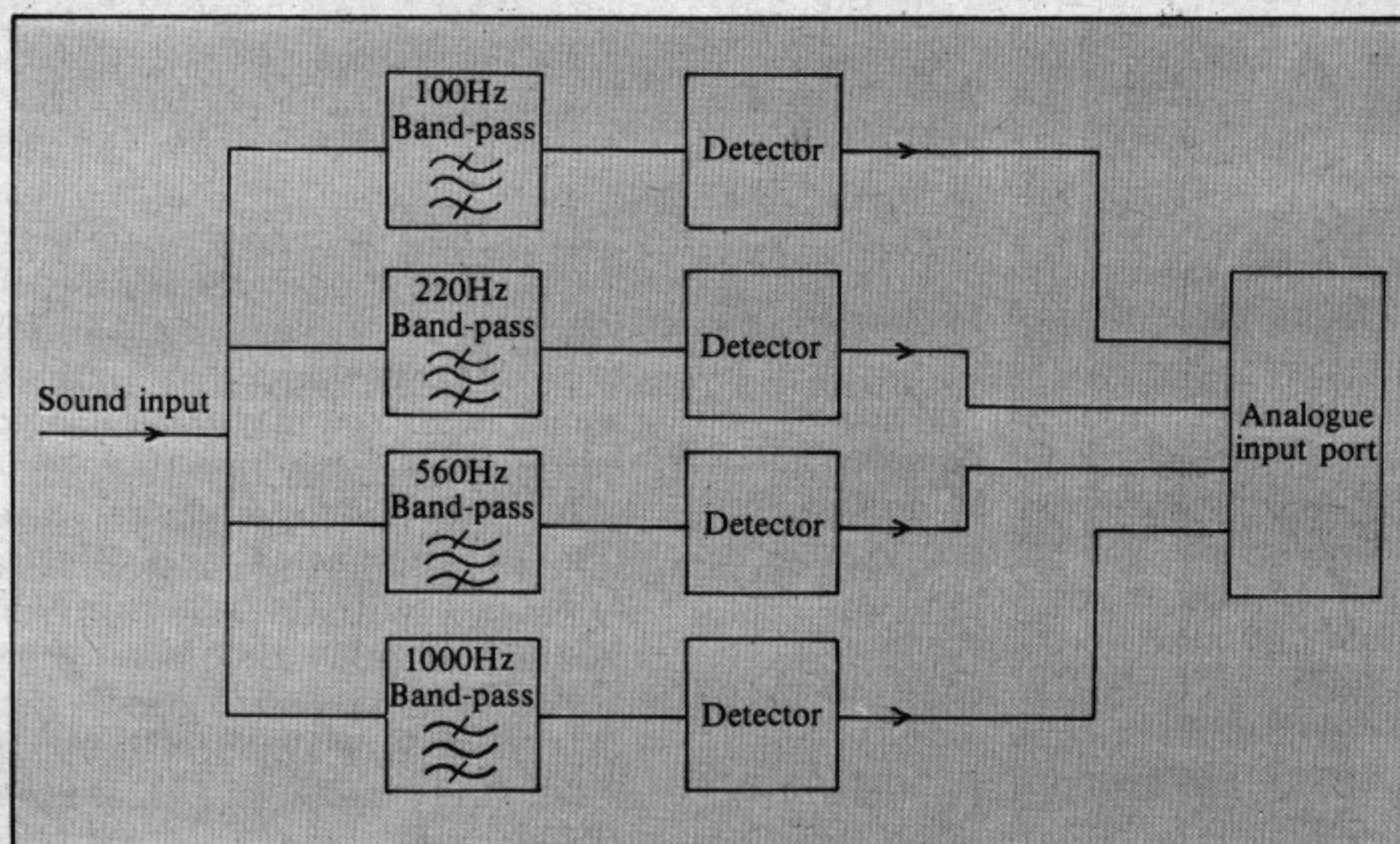


Figure I: Block diagram of our spectrum analyser

If you look at music on an oscilloscope you will see a complex ever-changing waveform. In fact it looks a mess. This is because when you use an oscilloscope you are looking at the signal as a plot of amplitude against time, known as a "time domain" view of the signal.

If, however, you take a short section of music (say half a second) and make a plot of the amplitude at each specific pitch you have what is known as a "frequency domain" view of the signal. This can be displayed using an instrument known as a spectrum analyser. (No, it doesn't work out what is wrong with rubber computers!)

The frequency domain view of a signal (or, as we say, its spectrum) shows, at any instant, the composition of the sound in terms of pitch. For most music, this means which instruments were playing at the instant the spectrum was taken.

So all we need for a picture of the sound is to feed our hi-fi into a spectrum analyser. As these cost around £3,000 it is not a very practical proposition.

We can make a crude simulation of a spectrum analyser by filtering the sound so that only a restricted band of frequencies is produced. This can be done with a band-pass filter.

If several band-pass filters are used, all at different frequencies, we can build up an approximation of the spectrum of the sound.

Figure I illustrates the principle: the sound is split up into four frequency-bands and the output of each filter is

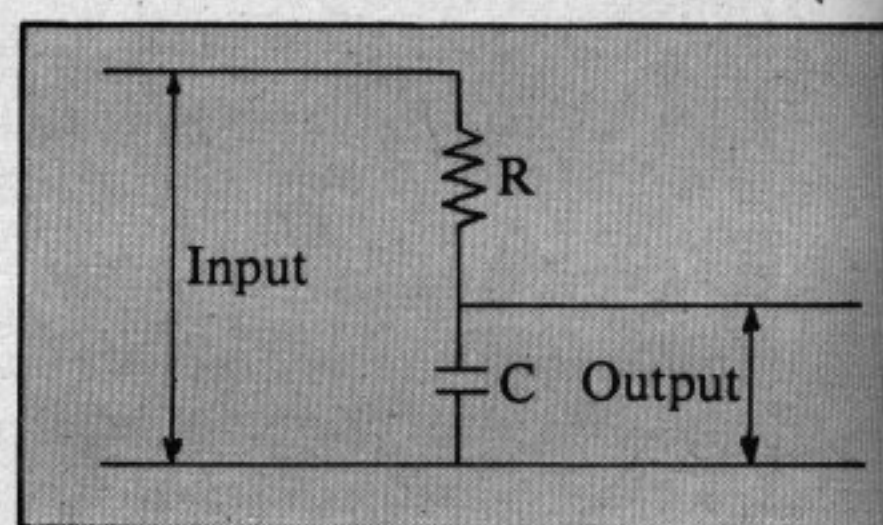


Figure II: A low pass filter

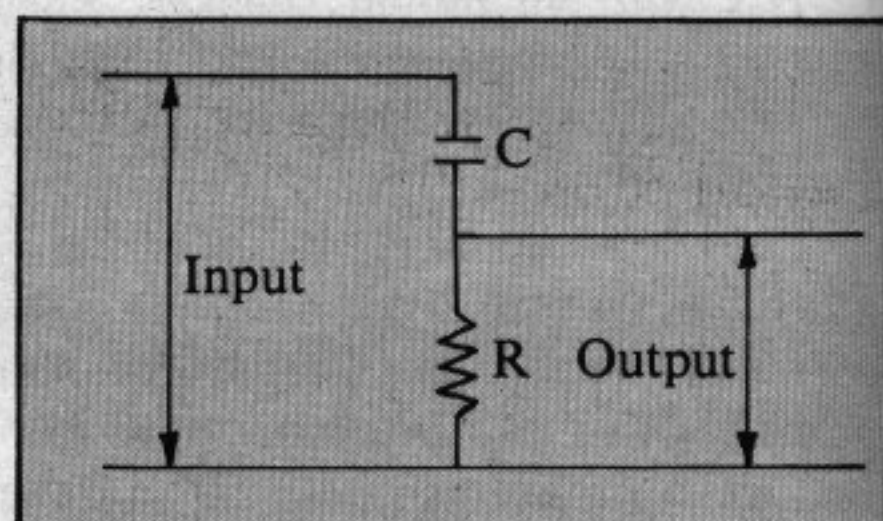


Figure III: A high pass filter

THE BEEB BODY BUILDING COURSE

PART 10

measured in order to build up the spectrum.

In terms of our ultimate goal, the samples can then be used as parameters to create patterns on the computer's display. The problem is to build four filters which will cover the same range of frequencies as the music.

A simple filter can be made with a capacitor and resistor. (See Figure II.) A capacitor does not allow DC to flow through it, only AC. The higher the frequency of this current, the more easily it flows.

In jargon we say the capacitor has a high impedance for low frequencies and a low impedance for high frequencies. Therefore a capacitor can be thought of as a frequency-dependent resistor.

So you will see in Figure II that if the input is a high frequency the output will be small, because the impedance of the capacitor is much smaller than the impedance of the resistor.

Conversely, for a low frequency input, the capacitor has such a high impedance it can be considered effectively removed. So the output will be the same as the input. Because low frequencies are passed through unchanged and high frequencies are attenuated (reduced) this is known as a low-pass filter.

See if you can work out why the circuit in Figure III is a high-pass filter.

By combining a high-pass and a low-pass filter we can produce a band-pass filter. Unfortunately, the circuits in Figures II and III are not usable in practice, due to the impedances of the input and output devices. We have to use amplifiers to reduce the effect of "loading impedances" as they are called.

When an amplifier is included in a filter it is called an active filter (not "Active Fitter" as one Ministry of Defence typist once titled a report of mine).

The simplest way of making an active filter is to use an operational amplifier (or op-amp).

Unfortunately, most op-amps need a split power supply, that is, one with a positive and negative voltage as well as a zero volt rail. This is available from the auxiliary power supply socket of the BBC Micro.

However, if you have a negative supply rail there is a danger that the

By MIKE COOK

output of the op-amp will go negative. This in itself is no problem, but if it is connected to the analogue input of the computer it will damage the A/D converter chip.

A better solution is to use an op-amp which does not need a negative supply. These little-known amplifiers work with input currents (as opposed to input voltages as used by the more conventional op-amps). They are known as Norton amplifiers and the symbol is shown in Figure IV.

These current-differencing amplifiers have been designed to work off single-supply voltages over a wide range (4 to 36 volts) and as such are ideal for use with digital electronics.

Like any op-amp they have two inputs. The first is known as the positive input, because any current flowing into it will be amplified and cause the output to rise. The other input is known as the negative or inverting input – when current flows into it, the output falls

(goes in a negative direction).

The trick of using op-amps is to arrange the feedback circuit (connecting the output to the input) so that these currents balance out and a stable output is achieved for a stable input. This is not nearly as difficult as it sounds.

Consider Figure V. When no voltage is applied at point P, the output voltage will rise due to the current flowing into the positive input. However, as it rises it makes more current flow into the negative input, which tends to force it down. This reaches equilibrium when the same amount of current is flowing in

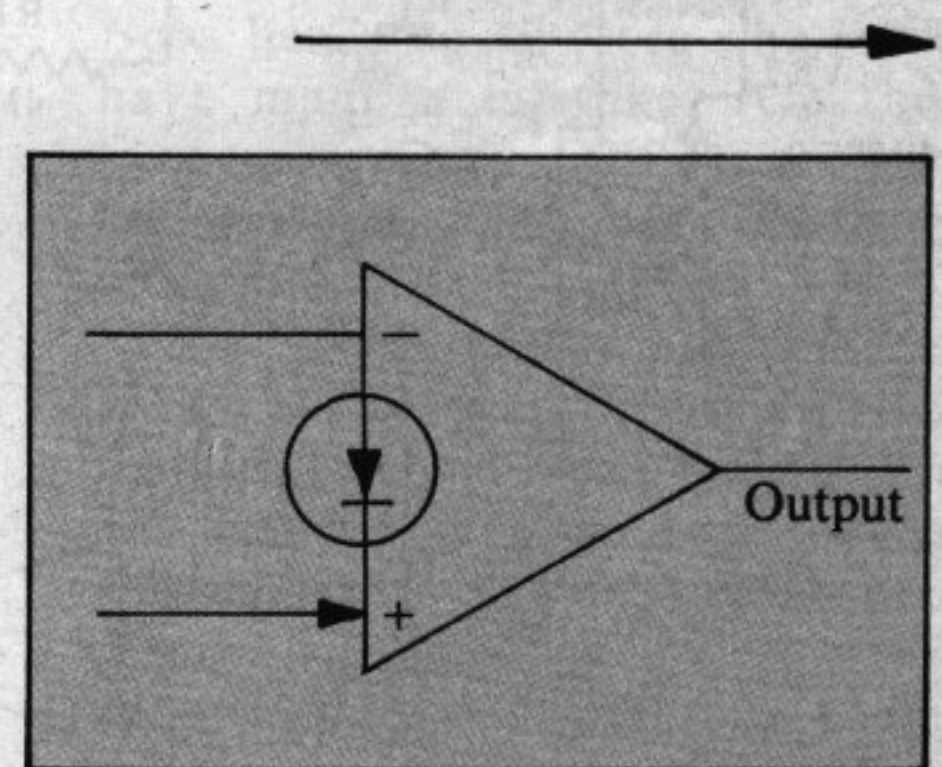


Figure IV: A Norton amplifier

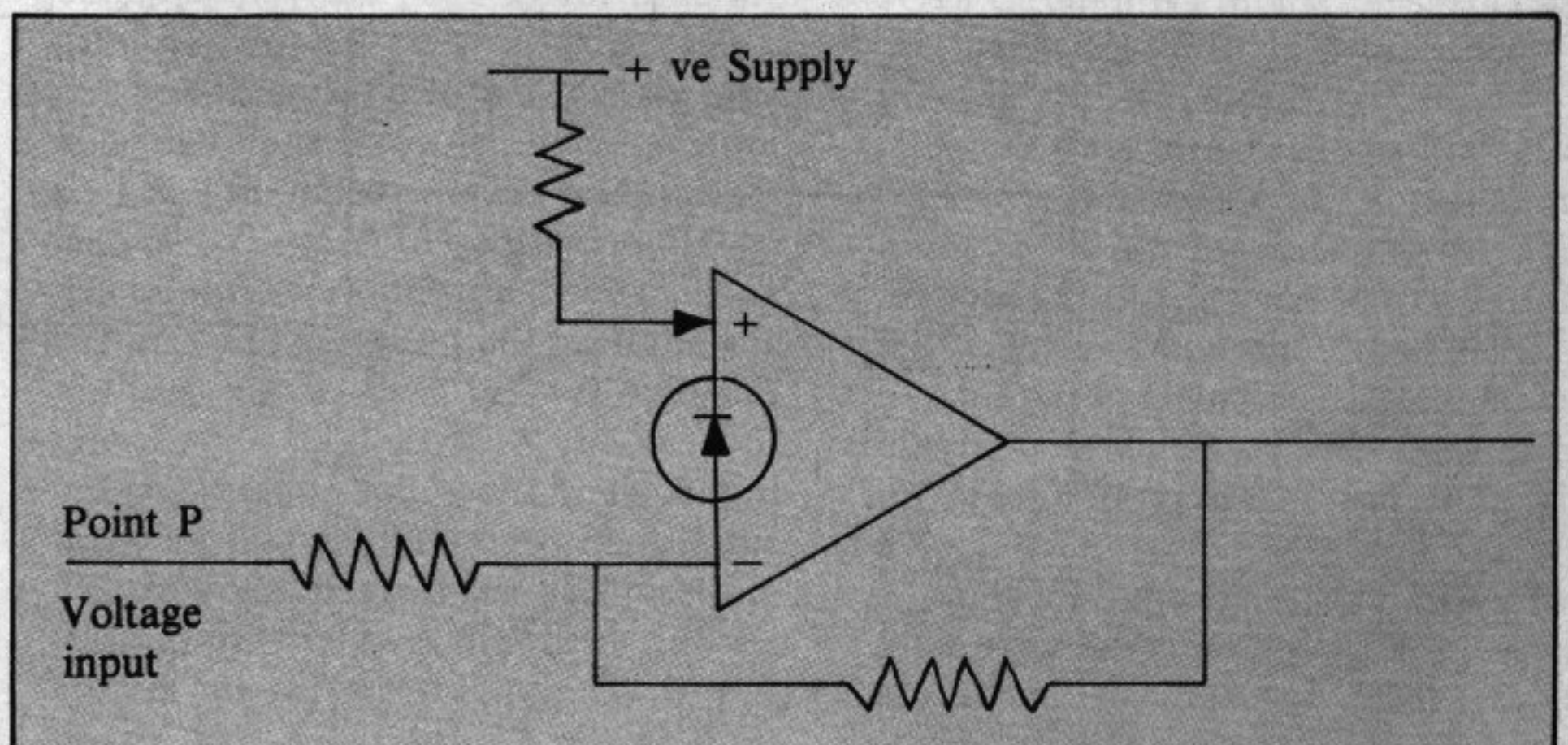


Figure V: An inverting amplifier

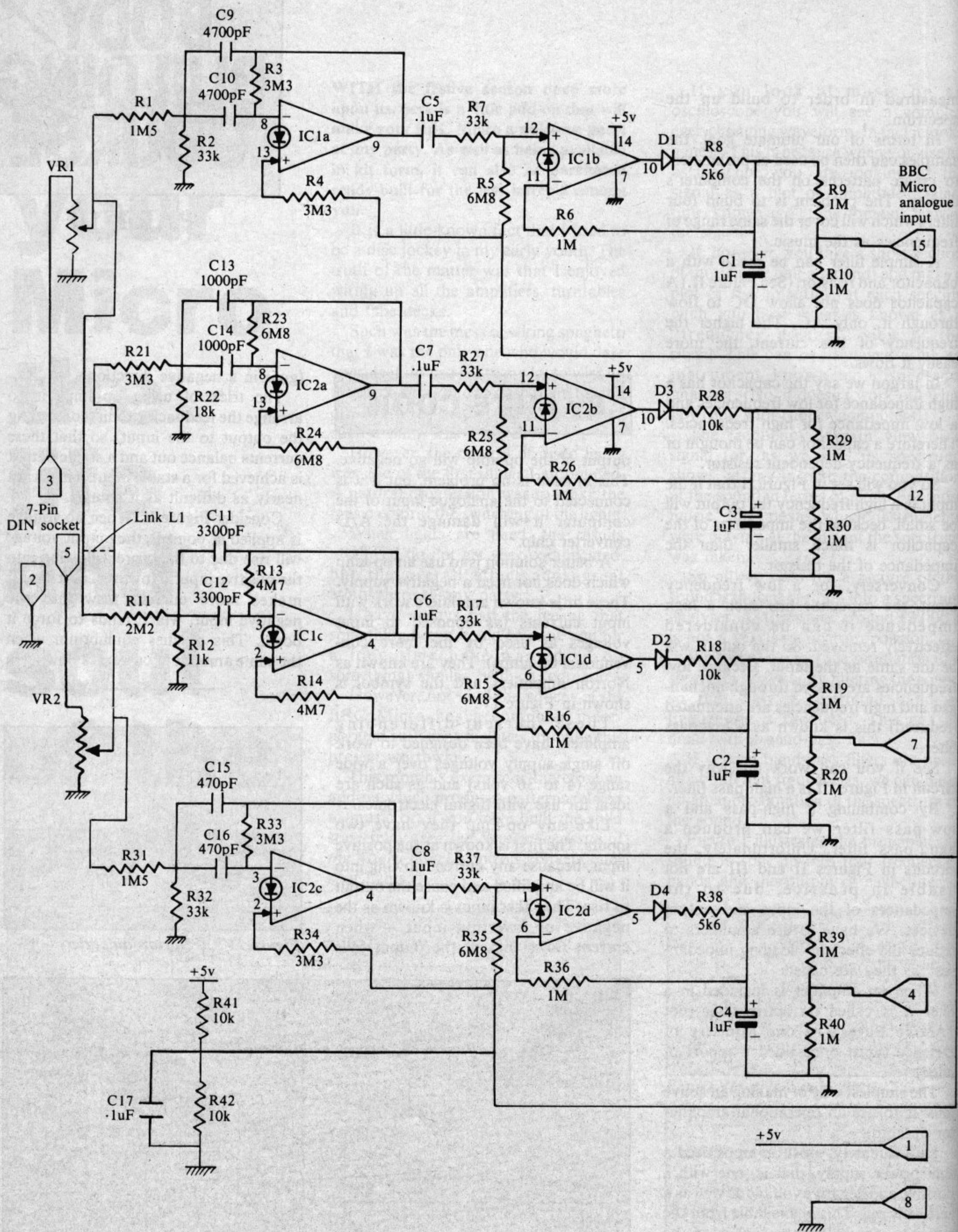


Figure VI: The sound-to-pattern converter

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both inputs of the op-amp.
When the voltage at point P starts to rise, more current flows into the negative input causing the output to fall, thus reducing the amount of feedback current, until again an equilibrium point is reached.

But this time, some of the current in the negative input will come from the signal, and some from the output (feedback). As the output falls when the input signal increases, this configuration is known as an inverting amplifier. You should be able to see that the gain of such an amplifier is controlled by the values of the resistors in the circuit.

If you understood that on the first reading you are doing very well. If not, go back and go through it again and sketch yourself little graphs of the input and output – I find it often helps. The Norton amplifier is available in a chip called the LM3900N. There are four of them, all in the same package.

Now, promise me you won't stop

reading this article, and go and have a peep at Figure VI. Pretty impressive hey? Well actually it's not that complicated, because as we need four filters, the basic circuit is just repeated four times. If you can bear it, have a closer look and you will see that the same circuit really is repeated. Only the component values differ.

Each strip of circuit corresponds to a separate filter/input circuit. The sound signal comes from the input socket. This is a 7-pin DIN socket wired up in exactly the same way as the cassette input socket of the BBC Micro. In this way you can use your cassette recorder to play the music (let's face it, it never was much good for programs!).

If you have a stereo input to this circuit, one channel is controlled by VR1 and the other by VR2. The input socket is wired up to allow this but if you only have a mono system the two halves should be joined together by making link L1.

If you are feeding the unit from the output of a hi-fi amplifier you can wire it up in parallel with the loudspeakers. If you are using stereo, make sure the common lead goes to earth. To be on the safe side, only wire up one speaker wire on one side and two on the other. If both channels do not work you can then safely swap wires until they do.

As the unit has a very high input impedance it will not place any loading on the sound source. A signal of about two volts RMS will be needed to drive the unit, but the sensitivity can be increased by software as we shall see later.

Construction can be done in a number of ways. I made the original prototype on Vero board, with flying leads connecting it to the computer. However, as it is a circuit which quite a lot of people might be interested in, I have produced a printed circuit board. This is available as a kit, with all the components. (See page 97 for ordering details.)

The board uses a 15-way D-type plug and just plugs into the analogue input socket. Two pillars are used at the other end of the board to support it. If you want, however, it may be made in a box to make it look neater, although there is nothing nicer than a well-laid-out circuit.

Construction of the circuit board involves finding the component value from the components list and inserting the appropriate component in the correct place on the printed circuit board. For example, C7 is a 0.1 uF capacitor and should be placed at the

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component position marked C7 on the printed circuit board.

Note that the resistors only have their number on them, they don't start with 'R'. The diodes need to be placed the right way round. This is shown by the band at one end. Again, match it up with the markings on the printed circuit board.

Apart from the ICs the only other components that need to be the correct way round are the electrolytic capacitors C1 to C4. A small white stripe and a + should be at one end. Put this end to the hole marked + on the board.

The four band-pass filters have their frequencies evenly distributed over the range used for the fundamental notes in most music. The exact frequencies are 100Hz, 220Hz, 560Hz and 1000Hz. Now, hands up all those who think I have made a mistake. Are those frequencies evenly distributed? Well in fact they are, as far as the ear is concerned.

This is because the response of the ear is very nearly logarithmic and so these frequencies sound evenly spaced. If you plot them out on a logarithmic scale you will see there is the same space between them.

Now – hold onto your hats – here is the simple version of how the circuit works. The signal is fed into the input of IC1a through R1 and R2 resistors and the capacitor C10. The feedback is provided by R3 and C9.

As we saw earlier, capacitors act as frequency-dependent resistors, so the amount of signal flowing into the amplifier both from the source and the feedback are frequency-dependent.

At low frequencies, the capacitors can be considered as open circuits. So no signal gets to the input of the amplifier.

At high frequencies, the capacitors are a very low impedance. So although the signal gets through to the input,

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RESISTORS 5%

| | |
|---------------------------------|-----|
| R1, R31 | 1M5 |
| R2, R7, R27, R17, R32, R37 | 33K |
| R3, R4, R21, R33, R34 | 3M3 |
| R5, R24, R25, R15, R35, R23 | 6M8 |
| R6, R9, R10, R16, R19, R20, R26 | 1M |
| R29, R30, R36, R39, R40 | 1M |
| R8, R38 | 5K6 |
| R28, R18, R41, R42 | 10K |
| R11 | 2M2 |
| R13, R14 | 4M7 |
| R22 | 18K |
| R12 | 11K |

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From Page 95

there is lots of negative feedback and the output does not move very much.

Only at some intermediate frequency is there any output. The resistor R4 provides a steady trickle of current, known as the bias current. This bias supply is provided from a potential divider formed by R41 and R42 and is used to prevent the resistor values becoming too high.

Once the signal has been filtered it is passed to the next stage (IC1b) which is known as a peak detector.

Capacitor C5 removes any DC component from the signal and feeds it into the input of the next op-amp. Current is also being supplied from R5 and is acting as the bias for this stage. The output of the op-amp is then passed through a diode.

A diode acts as a one-way valve, allowing current to flow from the output of the op-amp into the capacitor, but not allowing the capacitor to discharge back through the amplifier.

Therefore the diode only conducts when the voltage at the op-amp output is higher than that on the capacitor.

Thus the voltage on the capacitor

represents the peak voltage from the amplifier. Resistor R8 controls how fast this peak voltage builds up and R9 and R10 allow this voltage to decay. So the voltage fed into the analogue input socket represents the loudness of the music at that instant. This is known as following the envelope of the music.

All we have to do now is to feed our music signal into this circuit and use the values from the analogue input port to draw our patterns.

As usual I have written a program to illustrate how this is done, which gives very good results. But also, as usual, it is only a starting point for you to experiment with.

The signal being fed into the analogue input port is larger than I required, so it is cut down to size with the variable SCALE%. There is also a DC offset voltage on the input. This is removed by the variable OSET%. These values can be changed to increase the sensitivity of the circuit if the input signal is low.

To test the circuit, you only need to type in lines 10 to 180 (omitting line 150) and lines 950 to 1140.

This displays a bar graph of each input channel so you can make sure that it is moving over a good range. If not,

adjust the volume into the filters either from the source, or by adjusting the variable resistors. Alternatively, adjust the two variables already mentioned.

The procedure SAMP samples the appropriate input channel and scales the result so that it is between 0 and 40. The value is returned in the variable V. The procedure BAR then prints a line of stars proportional to the size of the input.

The display looks very much like the rows of flashing lights you get on some modern hi-fi systems.

Having got that working, you can now type in the rest of the program (not forgetting to add line 150). This uses the sound in three ways to produce moving patterns which seem to be evocative of the music being played.

Each different procedure is ended by pressing a key. If this were being used at a party you might like to end each display procedure after a certain time has elapsed – not forgetting to zero the time at the start of each procedure. The lines that need changing are 670, 950 and 1360.

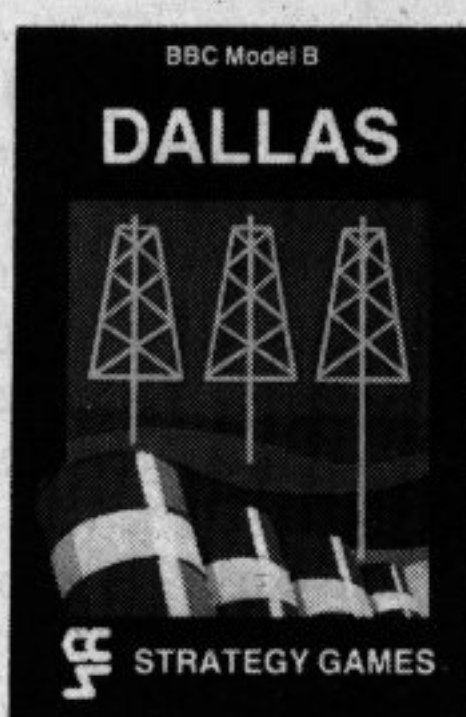
In order to speed up the patterns, the sound is made of a lookup table, X%(N) and Y%(N), to convert the sound input

PLANE SAILING



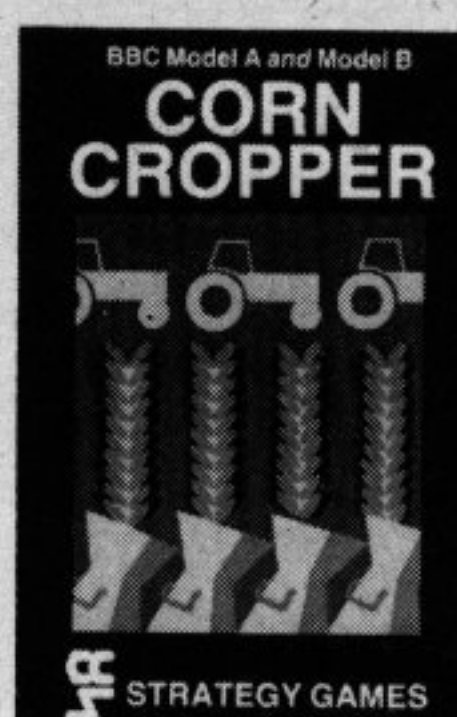
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values to screen co-ordinates. These are pre-calculated in the procedure LOOKUP, along with the initialisation of most constants used in the program. Wherever the program is sensitive to speed I have used integer variables.

The procedure POLYGON uses the value of each sound channel to control the position of each corner of a quadrilateral. This changes shape and distorts in sympathy with the music.

A record of each shape is stored in the array OX% and OY% (old X and old Y) and when there are N% shapes displayed the oldest of them is removed to make way for a new one. This prevents the screen becoming cluttered with remnants of old patterns.

The display responds rapidly to the change in music and is very effective, especially if the music contains a lot of variation and sudden chords.

The second display is more subtle. The pattern woven is much more intricate and changes more gradually. The patterns are very beautiful and seem to follow the mood of the music. This type of display is best suited to contemplative music.

The pattern is formed by marking a point on each axis which corresponds to each channel of the sound. Then every

point is joined up to every other point. This is repeated for each quadrant to give a pleasing symmetrical effect. Because the pattern is so complex, only two are displayed at any one time.

The final display is a rapid response display. Each quadrant of the screen is devoted to one channel. A triangle is drawn whose size and displacement from the centre are controlled by the sound-level on each channel.

Again, like the first procedure, the variable N% controls the number displayed at any one time.

In all the above procedures, the colour of the display has been chosen at random, as this seemed to give the most pleasing effect. But you could experiment with the choice of colour being made by the level on one of the channels.

I have found that, for a vigorous display, the patterns should be roughly predictable. I seem to get the greatest enjoyment from this when I can use my knowledge of the music to predict when the patterns will change.

I am more than pleased with the results given by the circuit. It has a very hypnotic effect – you could just stare at it all day. My wife made the point that it helps you listen to the music and gives

THE BEEB BODY BUILDING COURSE

you a focal point to concentrate on.

School music teachers might find it stops a class getting restless and helps the children pick out individual instruments when listening to music.

Unfortunately I cannot tell you how it fares under actual party conditions for two reasons. Firstly, this is being written before Christmas, so there are not many about, but mainly because I never seem to be asked to any. It might be the soap. I must start using some!

Next month we tell you how to cope with a slipped disc. Merry Christmas!

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Page 118**

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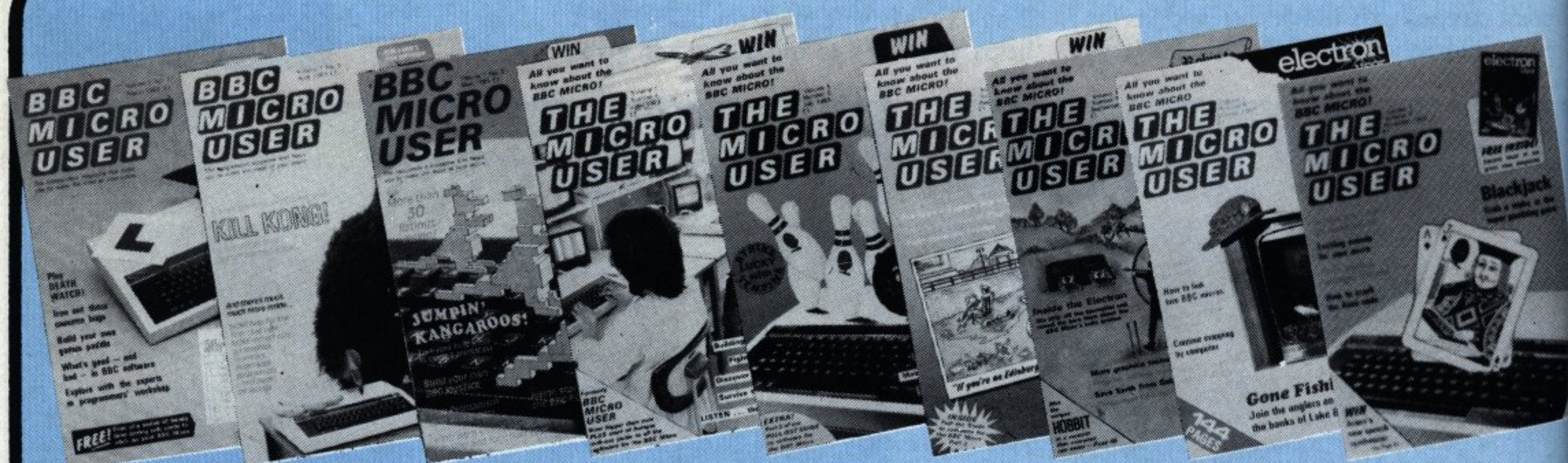
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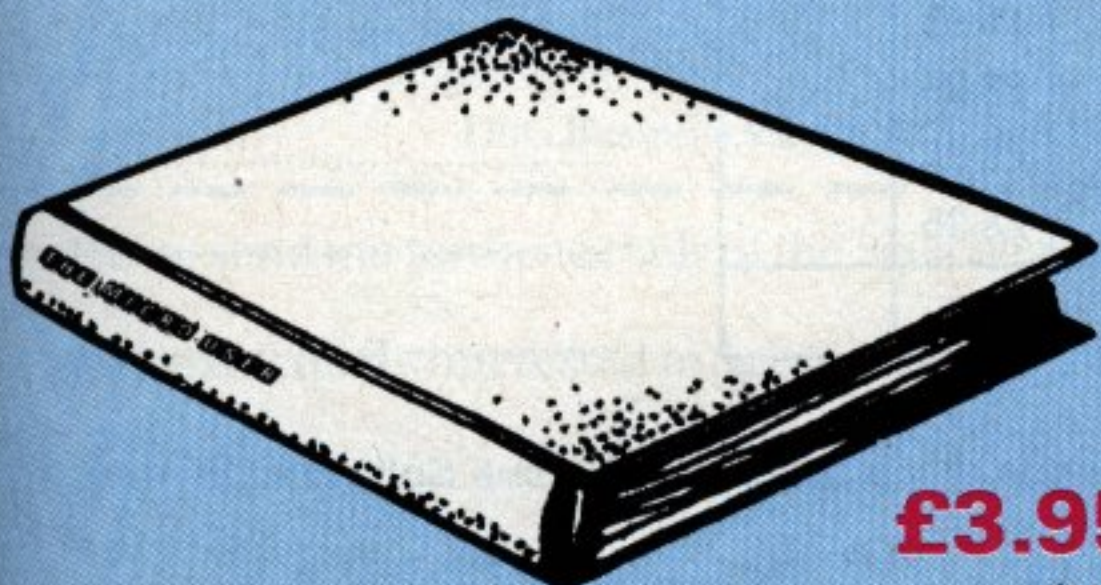
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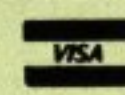
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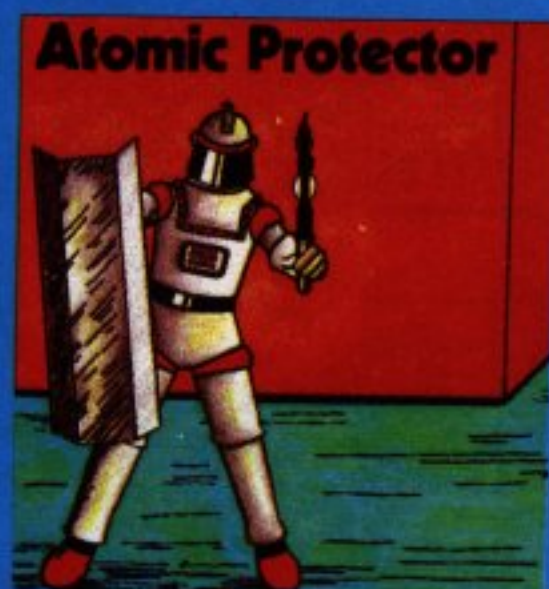
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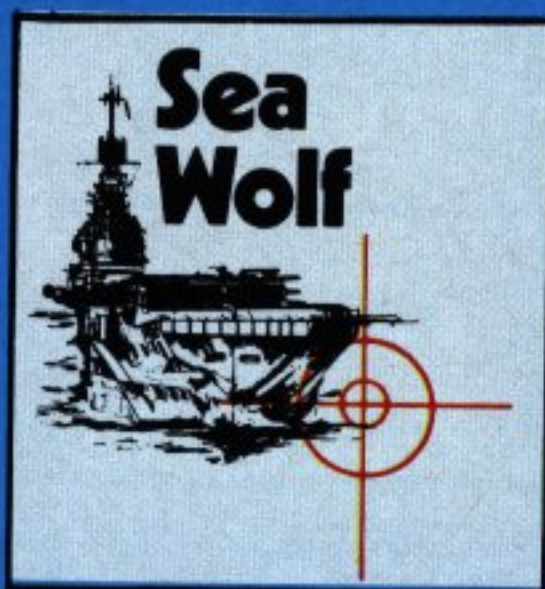


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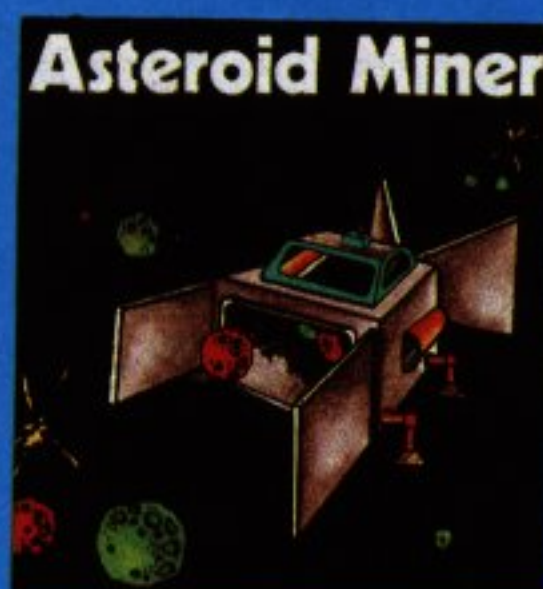
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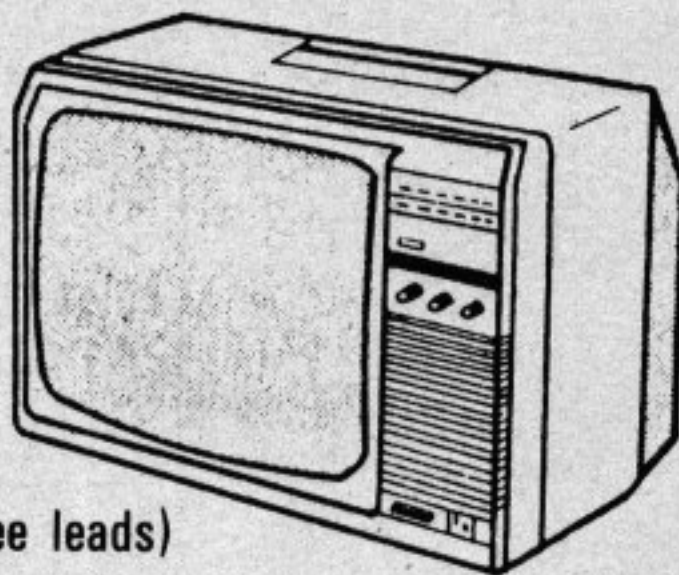
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MANY newcomers to micro-computing are somewhat puzzled by the fact that seemingly straightforward words and phrases take on a completely different meaning when used in a computing context. Here is a list, by no means comprehensive, that should allow the computer neophyte to make some sense of the new Computerspeak.

An innocent's guide to Computerspeak

"The applications of this are only limited by your own imagination" - I can't think of anything useful it can do.

"Compatible with any computer" - Will not work with your computer unless you know more about interfacing than we do.

"Standard" - We don't know enough about other computers to know why it won't work with yours.

"Universal standard" - We have actually tried it out on one other computer.

"Industry standard" - We have copied the design from someone else who says it works.

"Delivery will be in three weeks" - This is known as Holbein's constant as, whenever you ask the question, delivery will always be in three weeks.

"Delivery will be at the end of the month" - Another example of Holbein's constant, for the innumerate.

"In stock" - We have ordered it from the manufacturers.

"Now in stock" - When the closing date for advertisements was reached four weeks ago, we were promised delivery in three weeks.

"Obsolete" - A word to describe something actually in stock.

"Will be available shortly" - We haven't actually designed it yet but can foresee no difficulty.

"Will be available early next year" - We found the difficulty.

"Operating system" - Something that we sell you every six months or whenever you find out the last one doesn't actually work properly.

"This program can easily be modified to run on other popular computers" - Sometimes seen at the end of software articles and is a disclaimer for any in-

telligence the author might have falsely indicated to the reader.

"Programs may be saved on any domestic tape recorder" - This is any recorder except the one you actually own at the moment.

"Using your TV as a display" - Sometimes you may be able to actually read what is on the display as well.

"Can be easily expanded" - You have a bargain with what you have now but we will rip you off if you want to make it actually useful.

"User friendly" - You are asked for every little option and parameter to see if it needs to be included. This usually takes about ten minutes. In addition you have to go through the whole lot again if you want to change just one thing.

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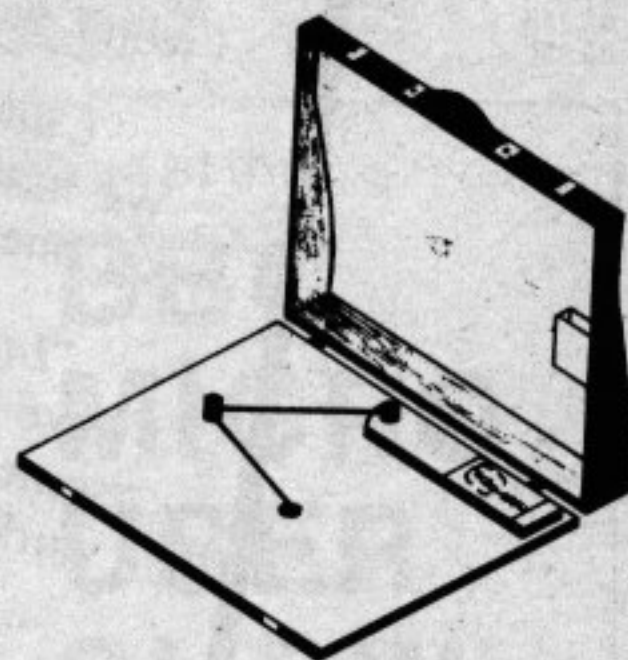
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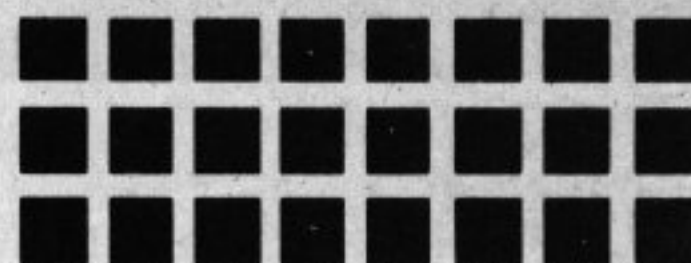


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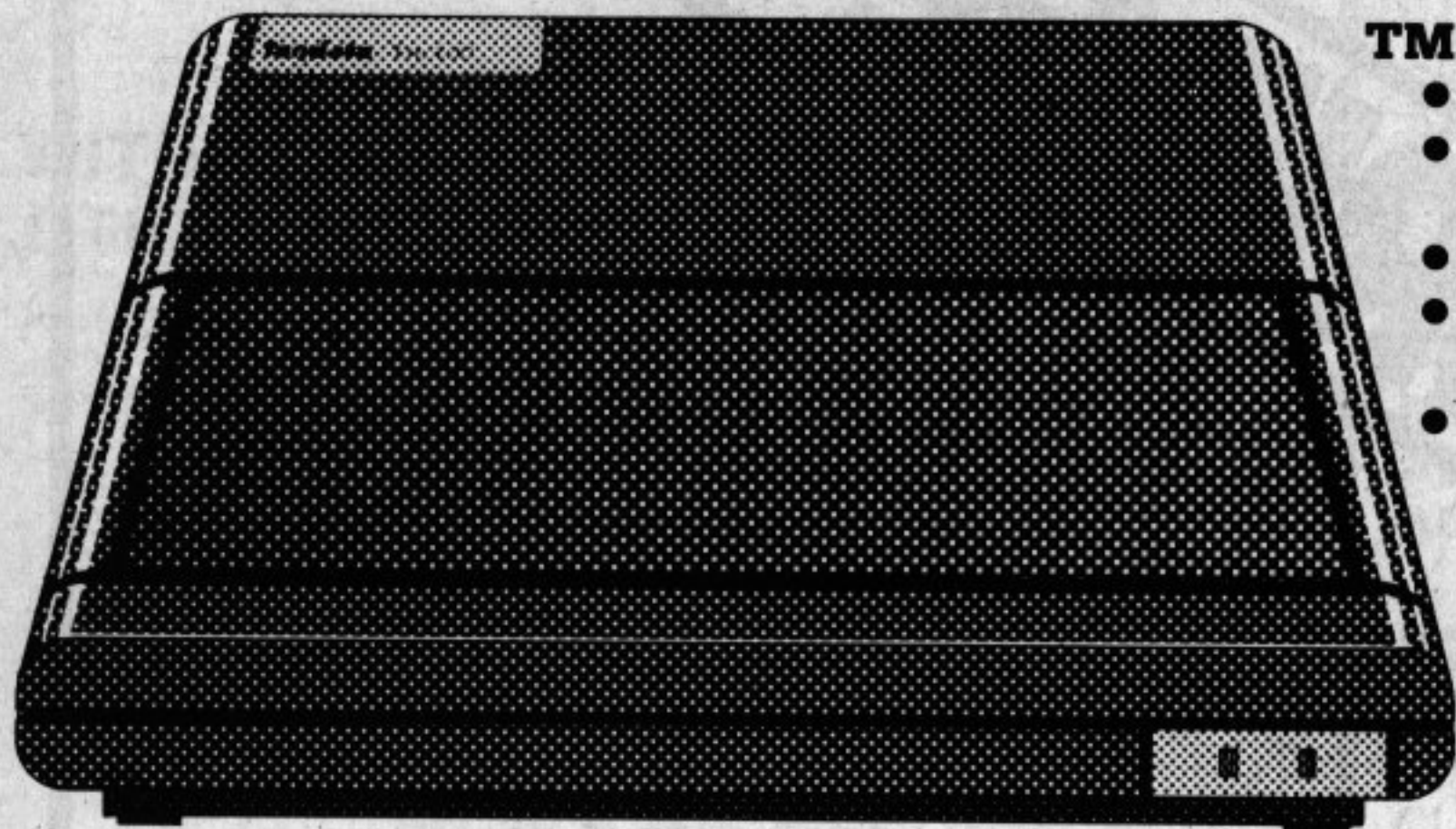
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| INPUT 100 strings | 22.7 | Write relative file backwards | 81.0 |
| BPUT 1000 bytes | 4.5 | Read relative file backwards | 36.0 |
| BGET 1000 bytes | 3.4 | | |

This independent disc filing system adds greater flexibility to your BBC Computer. It has two distinct modes which auto select on booting the system. Mode zero is the standard mode which retains compatibility with presently available software. Mode one, the extended mode, allows for sixty-three file names per disc, over 100% increase on the existing DFS, and also permits the file names to be up to fifteen characters in length, providing much greater scope for meaningful file names. In both modes page is set at &1500. This gives 10% more usable memory than Acorn's DFS, in modes 0, 1 and 2. If you already have a Disc interface fitted, it is very easy to upgrade, you simply remove the DFS Eprom and replace it with the Amcom DFS Eprom, if not then it is possible to purchase an entire Disc interface kit (consists of 11 I.C.'s) with this DFS track cutting is not required. **Also includes 8 way DIL switch to allow start up options to be set. (see below).**

Link 1 Determines if the system starts up in 40 or 80 tracks

Link 2 Select Acorn or Extended mode at start-up

Link 3 & 4 Selects type of drive ie. Shugart, Canon etc.

Link 5 Select auto-boot or not, on 'break'

Link 6-8 Select screen mode on start-up, ie. model 0 to 7 etc.

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- *Clear Quickly and easily erases a entire disc
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- *OPT3,n Alters the number of tracks per disc to n
- *OPT5,n Sets the start of the DFS buffer (see OPT7)

- *OPT6,n Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address.
- *OPT7,n Sets the length of the DFS buffer
- *OPT8,n Double steps the disc drive to allow the reading of 40 track discs on 80 track drives
- *SYS Selects either Acorn mode or Extended mode

Commands now include *Access

There is a built-in formatter which will format in either forty or eighty tracks in both modes of operation. This formatter also allows for user definable parameters to be included for the development of software protection. With this disc filing system a user definable buffer can be used while compacting the disc. This will enable disc compacting to be carried out without overwriting any programme in memory. Alternatively a new disc may be formatted without any resident programme being overwritten.

This DFS also allows for the use of wildcard characters, using either the \dagger symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).

This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programmes including printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc. Plus a utility to assist in the transfer of cassette files to disc.

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From Page 47

Program VII

```

10 REM *** PROGRAM VII ***
20 MODE 1
30 VDU23;11,0;0;0;0
40 PROCinit
50 PROCtriangles
60 PROCbase
70 PROCcandles
80 PROCballs
90 PROCfairy
100 PROCmessage
110 END
120 REM =====
130 DEF PROCinit
140 VDU 19,3,2,0,0,0
150 VDU 19,0,4,0,0,0
160 centre%=640
170 REPEAT
180 READ vdu%
190 IF vdu%<-1 THEN VDU vdu%
200 UNTIL vdu%=-1
210 candle$=CHR$(18)+CHR$(0)+CHR$(1)
+CHR$(224)+CHR$(10)+CHR$(8)+CHR$(225)
+CHR$(8)+CHR$(10)+CHR$(225)+CHR$(18)+C
HR$(0)+CHR$(2)+CHR$(11)+CHR$(11)+CHR$
(8)+CHR$(226)
220 REM Unfilled ball
230 uball$=CHR$(227)+CHR$(228)+CHR$(
10)+CHR$(8)+CHR$(8)+CHR$(229)+CHR$(230
)
240 REM Filled ball
250 fball$=CHR$(231)+CHR$(232)+CHR$(
10)+CHR$(8)+CHR$(8)+CHR$(233)+CHR$(234
)
260 REM Fairy
270 fairy$=CHR$(18)+CHR$(0)+CHR$(1)+
CHR$(235)+CHR$(236)+CHR$(237)+CHR$(10)
+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(238)+CHR
$(239)+CHR$(240)+CHR$(10)+CHR$(8)+CHR$
(8)+CHR$(8)+CHR$(241)+CHR$(242)+CHR$(2
43)
280 REM Fairy with wings
290 wfairy$=CHR$(18)+CHR$(0)+CHR$(2)
+CHR$(244)+CHR$(245)+CHR$(246)+CHR$(10
)+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(247)+CH
R$(248)+CHR$(249)+CHR$(10)+CHR$(8)+CHR
$(8)+CHR$(8)+CHR$(250)+CHR$(251)+CHR$(
252)
300 ENDPROC
310 REM =====
320 DEF PROCtriangles
330 GCOLOR,3
340 FOR counter%=1 TO 3
350 READ top%,offset%,bottom%
360 MOVE centre%,top%:MOVEcentre%-of
fset%,bottom%
370 PLOT 85,centre%+offset%,bottom%
380 NEXT counter%

```

```

390 ENDPROC
400 REM =====
410 DEF PROCbase
420 GCOLOR,1
430 READ offset%,height%
440 MOVE centre%+offset%,96:MOVE cen
tre%-offset%,96
450 PLOT 85,centre%+offset%,height%
460 PLOT 85,centre%-offset%,height%
470 ENDPROC
480 REM =====
490 DEF PROCcandles
500 VDU 5
510 FOR counter%=1 TO 6
520 READ xpos%,ypos%
530 MOVE xpos%,ypos%
540 PRINT candle$
550 NEXT counter%
560 VDU4
570 ENDPROC
580 REM =====
590 DEF PROCballs
600 VDU 5
610 FOR counter%=1 TO 6
620 READ xpos%,ypos%,outer%,inner%
630 GCOLOR,inner%:MOVE xpos%,ypos%
640 PRINT fball$
650 GCOLOR,outer%:MOVE xpos%,ypos%
660 PRINT uball$
670 NEXT
680 VDU 4
690 ENDPROC
700 REM =====
710 DEF PROCfairy
720 MOVE 596,1000
730 VDU 5
740 PRINT wfairy$
750 MOVE 596,1000
760 PRINT fairy$
770 VDU 4
780 ENDPROC
790 REM =====
800 DEF PROCmessage
810 VDU 5
820 GCOLOR,2
830 FOR counter%=0 TO 16STEP 4
840 MOVE 64-counter%,68-counter%
850 PRINT "MERRY CHRISTMAS AND A HAP
PY NEW YEAR"
860 NEXT counter%
870 MOVE 64-counter%,68-counter%
880 GCOLOR,1
890 PRINT "MERRY CHRISTMAS AND A HAP
PY NEW YEAR"
900 VDU4
910 ENDPROC
920 REM =====
930 REM Candle
940 DATA 23,224,16,56,56,124,124,56,

```

```

16,56,23,225,56,56,56,56,56,56,56
950 DATA 23,226,16,56,56,124,124,56,
16,0,23,255,16,56,56,124,124,56,0,0
960 REM Unfilled Ball
970 DATA 23,227,1,1,14,56,32,64,128,
128,23,228,128,128,112,28,4,2,1,1,23,2
29,128,128,64,64,32,24,7,0,23,230,1,1,
3,2,4,24,224,0
980 REM Filled Ball
990 DATA 23,231,1,1,15,63,63,127,255
,255,23,232,128,128,240,252,252,254,25
5,255,23,233,255,255,127,127,63,31,7,0
,23,234,255,255,255,254,252,248,224,0
1000 REM Fairy
1010 DATA 23,235,0,0,0,0,0,0,0,0,23,2
36,0,0,0,56,124,124,124,56,23,237,0,0,
0,0,0,0,0,23,238,0,0,1,3,7,0,0,0,23,
239,124,254,255,125,125,124,254,254
1020 DATA 23,240,0,0,0,128,192,0,0,0,
23,241,1,1,3,3,7,0,0,0,23,242,255,255,
255,255,255,0,0,0,23,243,0,0,128,128,1
92,0,0,0
1030 REM Fairy plus Wings
1040 DATA 23,244,0,32,48,56,60,60,62,
63,23,245,0,0,0,56,124,124,124,57,23,2
46,0,8,24,56,120,120,248,248,23,247,63
,63,63,63,63,63,62,60
1050 DATA 23,248,255,255,255,255,255,
255,254,126,23,249,248,248,248,248,248
,248,248,120,23,250,61,57,51,35,7,0,0,
0,23,251,255,255,255,255,255,0,0,0,23,
252,120,56,152,136,192,0,0,0
1060 DATA -1
1070 REM Triangles Data
1080 DATA 950,175,775,850,300,550,675
,400,300
1090 REM Base Data
1100 DATA 50,296
1110 REM Candle Positions
1120 DATA 460,871,805,871,335,646,930
,646,235,396,1030,396
1130 REM Ball Positions
1140 DATA 400,400,2,1,800,450,1,2,700
,650,0,1,600,500,1,0,450,625,0,2,575,7
50,2,0

```

Program VIII

```

10 REM *** PROGRAM VIII ***
20 MODE1
30 GCOLOR,2
40 VDU 5
50 FOR I%=0 TO 12 STEP 4
60 MOVE 544-I%,512-I%
70 PRINT "A WORD"
80 NEXT I%
90 MOVE 544-I%,512-I%
100 GCOLOR 0,1
110 PRINT "A WORD"
120 VDU 4

```


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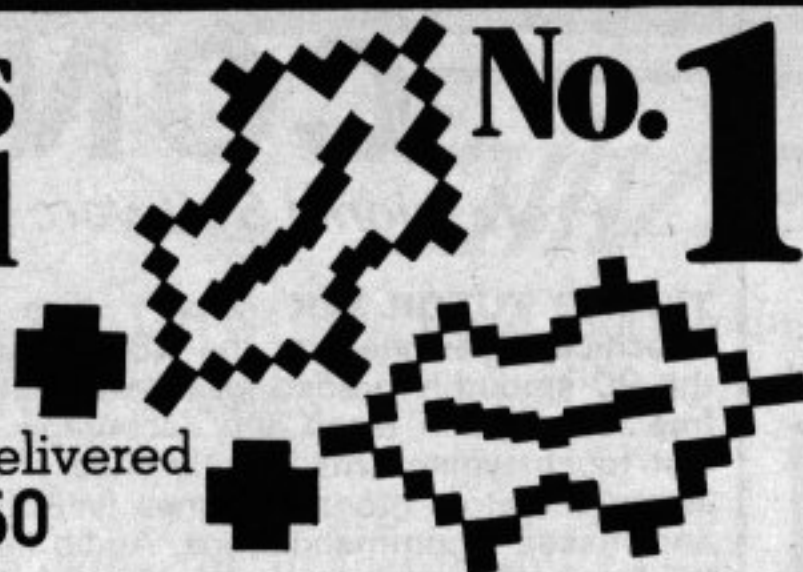
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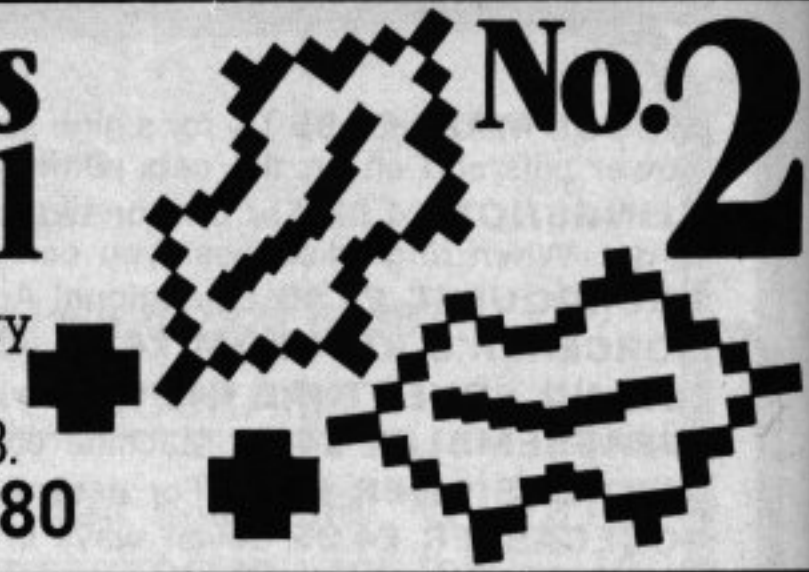
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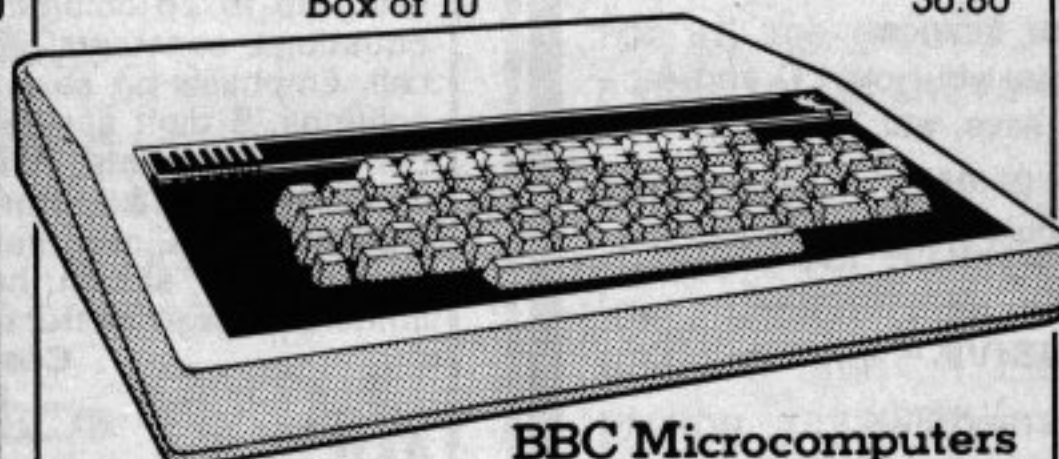
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From Page 69

```

10 REM *****
20 REM * *
30 REM * VDU23 *
40 REM * *
50 REM * Michael Murray 1983 *
60 REM * *
70 REM * A program to redefine
  and *
80 REM * manipulate user defined
  *
90 REM * characters. *
100 REM * *
110 REM *****
120
130 MODE 1
140 VDU 5
150 DIM PARAMETER%(8,7)
160 PROCGRID
170 PROCDRAW
180 PROCCOMMANDS
190 REPEAT
  :PROCCHOICE
  :PROCDRAW
  :PROCCOMMANDS
  :UNTIL FALSE
200 END
210
220 REM ***** GRID *****
230
240 DEF PROCGRID
250 FOR IX=32 TO 992 STEP 40
260 IF IXMOD 320=32 GCOL 0,3
  ELSE GCOL 0,1
270 MOVE 160,IX
  :PLOT 1,960,0
280 NEXT
290 FOR IX=160 TO 1120 STEP 40
300 IF IXMOD 320=160 GCOL 0,3
  ELSE GCOL 0,1
310 MOVE IX,32
  :PLOT 1,0,960
320 MOVE IX+4,32
  :PLOT 1,0,960
330 NEXT
340 VDU 23,224,&FF,&FF,&FF,&FF,&FF
  ,&FF,&FF,&FF
350 VDU 23,225,&FF,&C3,&C3,&C3,&C3
  ,&C3,&C3,&FF
360 ENDPROC
370
380 REM ***** DRAW *****
390
400 DEF PROCDRAW
410 GCOL 3,2
420 X%=168
  :Y%=984
430 MOVE X%,Y%
  :PRINT CHR$ (225)

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```

440 REPEAT
450 TIME =0
  :REPEAT UNTIL TIME >10
460 X1%=X%
  :Y1%=Y%
470 IF INKEY (-26) X%=X%-40
480 IF INKEY (-122) X%=X%+40
490 IF INKEY (-58) Y%=Y%+40
500 IF INKEY (-42) Y%=Y%-40
510 IF X%<168 OR X%>1088 X%=X1%
520 IF Y%<64 OR Y%>984 Y%=Y1%
530 MOVE X1%,Y1%
  :PRINT CHR$ (225)
540 MOVE X%,Y%
550 IF INKEY (-90) GCOL 0,0
  :VDU 224,8
  :GCOL 3,2
560 IF INKEY (-106) GCOL 0,2
  :VDU 224,8
  :GCOL 3,2
570 VDU 225
580 UNTIL INKEY (-74)
590 VDU 8,225
600 ENDPROC
610
620 REM ***** COMMANDS *****
630
640 DEF PROCCOMMANDS
650 FX=0
660 FOR RX=704 TO 44 STEP -320
670 FOR CX=168 TO 808 STEP 320
680 FOR PX=280 TO 0 STEP -40
690 BYTEX=0
700 FOR BX=0 TO 280 STEP 40
710 IF POINT(CX+BX,RX+PX)>0 BYTEX=BYT
  EX+2*(7-BXDIV 40)
720 NEXT
730 PARAMETER%(FX,7-PXDIV 40)=BYTEX
740 NEXT
750 FX=FX+1
760 NEXT
  :NEXT
770 FOR FX=0 TO 8
780 VDU 23,224+FX,PARAMETER%(FX
  ,0),PARAMETER%(FX,1),PARAMETER%(F
  X,2),PARAMETER%(FX,3),PARAMETER%(
  FX,4),PARAMETER%(FX,5),PARAMETER%
  (FX,6),PARAMETER%(FX,7)
790 NEXT
800 CLS
  :MOVE 0,1024
  :GCOL 0,3

```

```

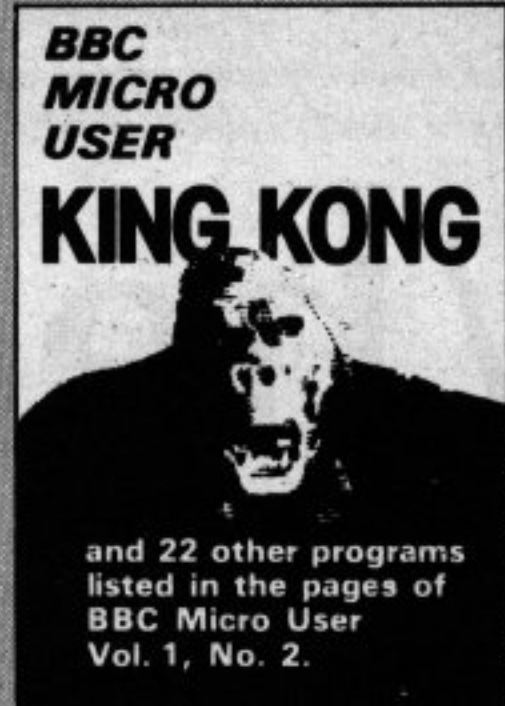
  :PRINT "THE COMMANDS ARE:"
  :GCOL 0,2
810 FOR FIGURE%=0 TO 8
820 PRINT "VDU23,";FIGURE%+224;
830 FOR PARAM%=0 TO 7
840 PRINT ",";PARAMETER%(FIGURE%
  ,PARAM%);
850 NEXT
860 GCOL 0,3
  :PRINT " "CHR$ (FIGURE%+224)
  :GCOL 0,2
870 NEXT
880 MOVE 288,208
  :PRINT "Model1"
  :MOVE 576,208
  :PRINT "Mode2 or 5"
890 MOVE 320,160
900 GCOL 0,3
  :VDU 224,225,226,8,8,8,10,227
  ,228,229,8,8,8,10,230,231,232
910 PROCMODE5
920 MOVE 192,32
  :GCOL 0,2
  :PRINT "Press SPACE to continue"
  :REPEAT UNTIL INKEY (-99)
930 ENDPROC
940
950 REM ***** MODE5 *****
960
970 DEF PROCMODE5
980 FOR X%=320 TO 416 STEP 4
990 FOR Y%=64 TO 160 STEP 4
1000 IF POINT(X%,Y%)>0 MOVE X%*2
  ,Y%
  :PLOT 1,4,0
1010 NEXT
  :NEXT
1020 ENDPROC
1030
1040 REM ***** RE_DRAW *****
1050
1060 DEF PROCDRAW
1070 GCOL 0,2
1080 FOR FX=0 TO 8
1090 X%=168+320*(FXMOD 3)
1100 FOR PX=0 TO 7
1110 Y%=984-320*(FXDIV 3)
1120 IX=PARAMETER%(FX,PX)
1130 FOR BX=0 TO 7
1140 IF IX-2*(7-BX)>-1 MOVE X%+40*B%
  ,Y%-40*P%
  :VDU 224
  :IX=IX-2*(7-BX)
1150 NEXT
  :NEXT
  :NEXT
1160 ENDPROC
1170

```




March Issue

DEATHWATCH, a superb arcade game that challenges you to use your skill to fight off enemy battleships, tanks and helicopters; **BINGO**, illustrating clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** for function keys in machine code routines; a useful **CASSETTE BUGS FIX** for users with OS 0.1... and many **COLOUR** and **GRAPHICS ROUTINES** to help you create a kaleidoscope of screen designs which you can incorporate into your own programs.



April Issue

KING KONG, a fast moving game in which you pilot a helicopter to rescue girls perched on the Empire State Building before killing Kong; **GRAPHICS**, a suite of colourful demonstration programs; **NIM**, a structural game of strategy; **TOKENS**, first steps in unravelling the Basic ROM; **HOROSCOPES**, a fun program with useful error-trapping routines; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler; **HEAT & LIGHT**, two measuring and plotting programs.



May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; 25 **ANAGRAMS**, an entertaining word game for you to play; **CHARACTER**, to generate vertical and inverted text; **TELETEXT**, animation in Mode 7, really brings the screen to life; **LAB**, a trio of programs to interface laboratory equipment; 10 programs to investigate the **OSBYTE** routine; **BEEB**, two joystick exercises; plus more **COLOUR** and **GRAPHICS** routines.



June Issue

SPACE PILOT, lost in space with dwindling fuel supplies, you must fight off repeated attacks from alien life forms. To replenish fuel, you have to perform a tricky docking manoeuvre, while to repair the inevitable damage you must land on a mountainous planet. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. Can you survive drought, tsetse fly and other hazards? **COLOURFUL CHARACTERS PLUS** other listings from the June issue.



July Issue

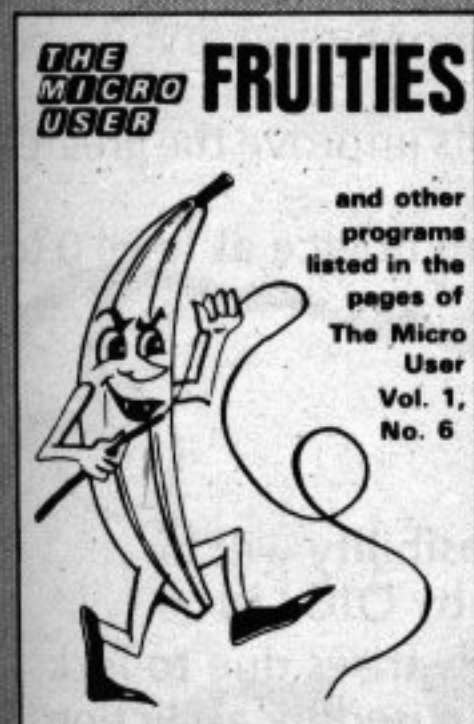
TENPIN, a highly entertaining simulation of Tenpin Bowling; **SPACEPODS**, Try to beat alien hordes; **CUP**, Exciting techniques to bring 3D graphics to the BBC Micro; **SCRSAVE** and **CSRLOAD**, Two programs to allow you to save and load screens to tape or disc; **TEST** and **STEADY**, A pair of programs to accompany the Beeb Body Building Course; **BREAKFIX**, Don't let the Break key destroy all your precious variables! **FORMAT**, Create neater listings with this invaluable utility.

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ON PAGE 99



August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. Can you survive all the terrors that await you, or will you, too, fall victim to the evil Fruities? A really superb game. **ANIMATION**, a suite of programs that show you how to really bring your screen alive; **CASDISC**, The essential machine code downloader for your disc system; **MODE 7** colour routines to bring your screen to life. **PLUS** other listings from the August issue.



September Issue

ROBIN & MARIAN, a highly-challenging game in which you play the part of Robin Hood rescuing Maid Marian from the clutches of the Sheriff of Nottingham. **GALACTIC INVADERS**, an extremely well-written cross between two well-known arcade games. **DFS BENCHMARKS**, 14 programs to test out disc filing systems. **ANIMATION**, four programs to teach new techniques. **Terminal**, three programs to connect a BBC Micro to a mainframe. **PLUS** other listings from the September issue.



October Issue

FISHING, a compulsive simulation of a day's angling. **JOYKEY**, to convert your programs to joystick control. **PENTEST**, tests the Micro User light pen, and **BELLRINGER**, an amusing and musical way to use it. **CONTOURS**, an educational program with many uses. **LINKs**, two superb pieces of software to let BBC Micros talk to each other. **CHESs**, the winning entry in our June contest. **PLUS** six other programs from the pages of The Micro User, and all the listings from the first issue of Electron User.



November Issue

GOBLINS, a journey through an enchanted forest. **BLACKJACK**, a recreation of the casino favourite. **CHARGE** and **PENDULUM**, two ingenious programs from Body Building Course part 9. **SIDWAYS**, to store programs in sideways ROMs. **PENDRAW**, a light pen sketching program. **SOUNDS**, seven programs illustrating the excellent sound of the BBC Micro. **TUTORIAL**, listings from part 7 of our beginners' series **PLUS** all the programs from the second issue of Electron User.



December Issue

TOWER, rescue London's treasure from the ghastly ghosts of Tower Bridge. **SANTA**, help Father Christmas deliver his presents despite the striking reindeer! **CARD**, an electronic greetings card from Micro User to you. **VDU 23**, an invaluable character defining utility. **PAGED**, the listing from our paged graphics article. **BODY**, the program accompanying Body Building Part 10 **PLUS** 14 other programs from the pages of The Micro User and all the listings from the third issue of Electron User.

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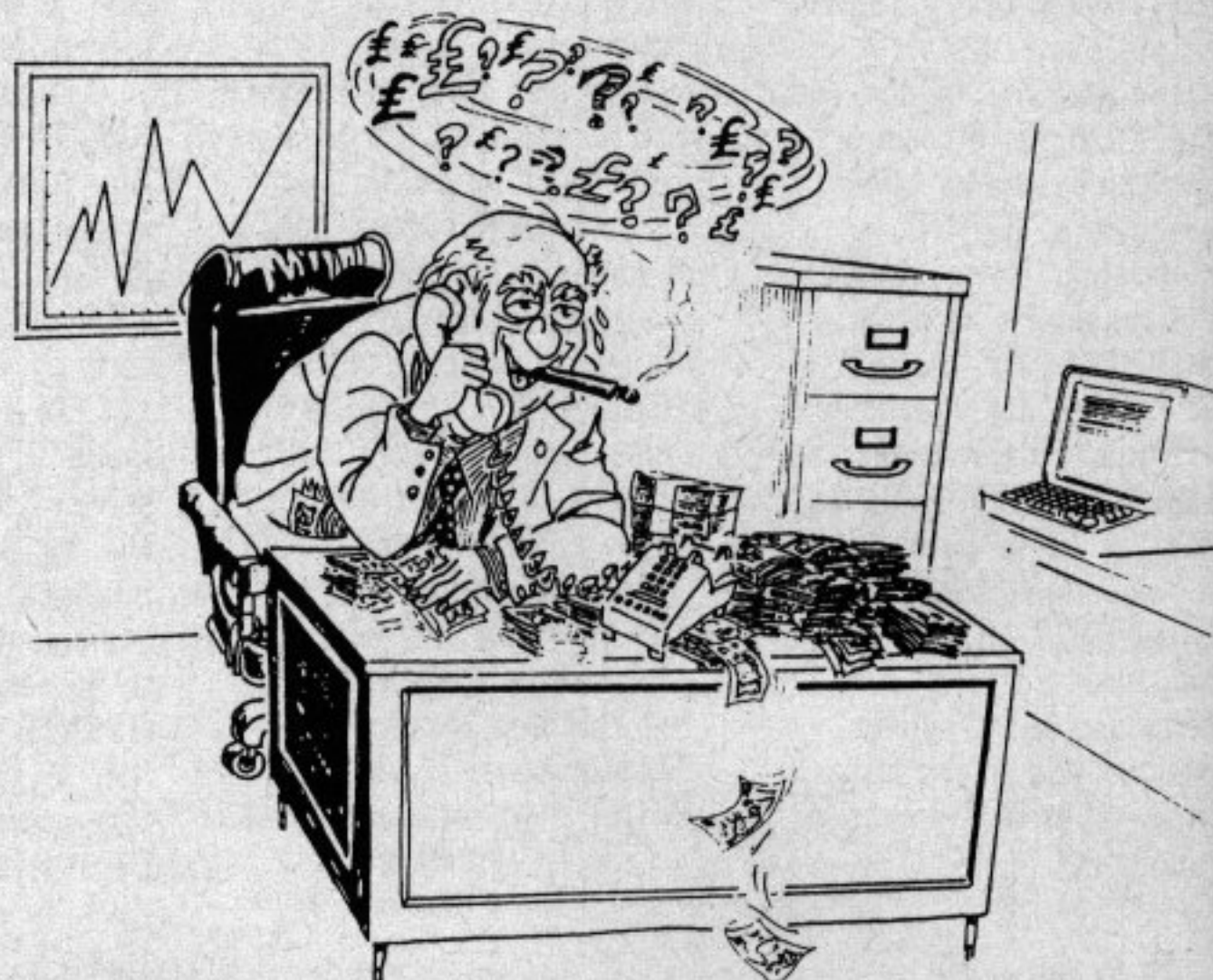
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From Page 112

```

1180 REM ***** ROTATE RIGHT *****
    ***
1190
1200 DEF PROCROTATE_R
1210 GCOL 0,2
1220 FOR F%=0 TO 8
1230 X%=1088-320*(F%DIV 3)
1240 FOR P%=0 TO 7
1250 Y%=984-320*(F%MOD 3)
1260 I%=PARAMETER%(F%,P%)
1270 FOR B%=0 TO 7
1280 IF I%-2^(7-B%)>-1 MOVE X%-40*P%
    ,Y%-40*B%
    :VDU 224
    :I%=I%-2^(7-B%)
1290 NEXT
    :NEXT
    :NEXT
1300 ENDPROC
1310
1320 REM ***** MIRROR IMAGE *****
    ***
1330
1340 DEF PROCMIRROR
1350 GCOL 0,2
1360 FOR F%=0 TO 8
1370 X%=1088-320*(F%MOD 3)
1380 FOR P%=0 TO 7
1390 Y%=984-320*(F%DIV 3)
1400 I%=PARAMETER%(F%,P%)
1410 FOR B%=0 TO 7
1420 IF I%-2^(7-B%)>-1 MOVE X%-40*B%
    ,Y%-40*P%
    :VDU 224
    :I%=I%-2^(7-B%)
1430 NEXT
    :NEXT
    :NEXT
1440 ENDPROC
1450
1460 REM ***** ROTATE LEFT *****
    **
1470
1480 DEF PROCROTATE_L
1490 GCOL 0,2
1500 FOR F%=0 TO 8
1510 X%=168+320*(F%DIV 3)
1520 FOR P%=0 TO 7
1530 Y%=64+320*(F%MOD 3)
1540 I%=PARAMETER%(F%,P%)
1550 FOR B%=0 TO 7
1560 IF I%-2^(7-B%)>-1 MOVE X%+40*P%
    ,Y%+40*B%
    :VDU 224
    :I%=I%-2^(7-B%)
1570 NEXT
    :NEXT
    :NEXT
1580 ENDPROC
1590
1600 REM ***** CHOICE *****
1610
1620 DEF PROCCHOICE
1630 CLG
    :GCOL 0,3
    :MOVE 0,992
    :PRINT "WHICH OPTION ?"
1640 GCOL 0,2
    :PRINT "A. Start again." "B.
    Return to this character set."
1650 PRINT "C. Rotate right." "D.
    Rotate left."
1660 PRINT "E. Mirror image left_right
    ." "F. Exit the program."
1670 GCOL 0,3
    :PRINT "" "Press A_F"
1680 REPEAT
1690 *FX21,0
1700 G$=GET$
1710 UNTIL G$>"@" AND G$<"6"
1720 IF G$="A" RUN
1730 IF G$="F" END
1740 CLG
    :PROCGRID
1750 IF G$="B" PROCREDRAW
    :ENDPROC
1760 IF G$="C" PROCROTATE_R
    :ENDPROC
1770 IF G$="D" PROCROTATE_L
    :ENDPROC
1780 IF G$="E" PROCMIRROR
    :ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 99.

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"Everyone has got at least one novel inside him, and every BBC Micro owner has at least one original game waiting to be programmed." – Zen in the Art of Computer Programming.

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Of course, if it's good enough, we shall want to include it in the pages of BBC Micro User. So send a copy of your original games program, on cassette or disc, to:

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advert elsewhere in this issue for order form.

From Page 97

```

10 MODE 7
20 PRINT "Beeb Bodybuilding Course"
30 PRINT "Sound to Pattern Converter"
40 PRINT "THE MICRO USER"
50 PRINT "December 1983"
60 PRINT "By Mike Cook"
70 PRINT
80 PRINT "PRESS ANY KEY TO CHANGE
  PATTERN"
90 *FX16,4
100 SCALEX=1024
110 OSETX=16
120 NX=8
130 DIM X%(40),Y%(40),DX%(NX,4)
    ,OY%(NX,4)
140 DIM SX%(4),SY%(4)
150 PROC_LOOKUP
160 AX=GET
170 MODE 7
180 PROCBAR
190 REPEAT
200 MODE 2
210 VDU 29,640;512;
220 PROC_POLYGON
230 PROC_LINE
240 PROC_TRI
250 UNTIL FALSE
260 END
270 DEF PROC_LOOKUP
280 FOR A=0 TO 40
290 X%(A)=A*16
300 Y%(A)=A*12.8
310 NEXT
320 FOR A=0 TO NX
330 FOR B=1 TO 4
340 DX%(A,B)=0
350 OY%(A,B)=0
360 SX%(B)=1
    :SY%(B)=1
370 NEXT
380 NEXT
390 SX%(2)=-1
    :SX%(3)=-1
400 SY%(3)=-1
    :SY%(4)=-1
410 ENDPROC
420 DEF PROC_LINE
430 CLS
440 VDU 23,1,0;0;0;0;0;
450 LOCAL AX,BX,CX,NPX
460 NPX=1
470 REPEAT
480 GCOL 3,RND(7)

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```

490 FOR AX=1 TO 4
500 PROC_SAMP(AX)
510 DX%(NPX,AX)=X%(VX)
520 OY%(NPX,AX)=Y%(VX)
530 NEXT
540 FOR AX=1 TO 4
550 FOR BX=1 TO 4
560 FOR CX=1 TO 4
570 MOVE SX%(CX)*DX%(NPX,BX),0
580 DRAW 0,SY%(CX)*OY%(NPX,AX)
590 NEXT
    :NEXT
    :NEXT
600 NPX=NPX+1
610 FOR AX=1 TO 4
620 FOR BX=1 TO 4
630 FOR CX=1 TO 4
640 MOVE SX%(CX)*DX%(NPX,BX),0
650 PLOT 7,0,SY%(CX)*OY%(NPX,AX)
660 NEXT
    :NEXT
    :NEXT
670 UNTIL NOT (INKEY (0))
680 ENDPROC
690 DEF PROC_POLYGON
700 CLS
710 VDU 23,1,0;0;0;0;0;
720 LOCAL AX,NPX
730 NPX=1
740 REPEAT
750 GCOL 1,RND(7)
760 FOR AX=1 TO 4
770 PROC_SAMP(AX)
780 DX%(NPX,AX)=SX%(AX)*X%(VX)
790 OY%(NPX,AX)=SY%(AX)*Y%(VX)
800 NEXT
810 MOVE DX%(NPX,1),OY%(NPX,1)
820 FOR AX=2 TO 4
830 DRAW DX%(NPX,AX),OY%(NPX,AX)
840 NEXT
850 DRAW DX%(NPX,1),OY%(NPX,1)

```

This listing is included in this month's cassette tape offer. See order form on Page 99.

```

860 NPX=NPX+1
870 IF NPX>NX
    THEN NPX=1
880 MOVE DX%(NPX,1),OY%(NPX,1)
890 FOR AX=2 TO 4
900 PLOT 7,DX%(NPX,AX),OY%(NPX,AX)
910 NEXT
920 PLOT 7,DX%(NPX,1),OY%(NPX,1)
930 UNTIL NOT (INKEY (0))
940 ENDPROC
950 DEF PROCBAR
960 VDU 23,1,0;0;0;0;0;
970 CLS
980 PRINT "BAR GRAPH OF SOUND"
990 PRINT
1000 PRINT "SET UP VOLUME LEVELS"
1010 REPEAT
1020 PRINT TAB(0,8)
1030 TIME =0
1040 FOR A=1 TO 4
1050 PROC_SAMP(A)
1060 PRINT STRING$(VX,"*");SPC (40-VX)
1070 NEXT
1080 UNTIL NOT (INKEY (0))
1090 ENDPROC
1100 DEF PROC_SAMP(CX)
1110 VX=ADVAL (CX) DIV SCALEX - OSETX
1120 IF VX<0
    THEN VX=0
1130 IF VX>39
    THEN VX=39
1140 ENDPROC
1150 DEF PROC_TRI
1160 LOCAL NPX,AX
1170 NPX=1
1180 CLS
1190 REPEAT
1200 FOR AX=1 TO 4
1210 MOVE DX%(NPX,AX),OY%(NPX,AX)
1220 PLOT 7,0,OY%(NPX,AX)
1230 PLOT 7,DX%(NPX,AX),0
1240 PLOT 7,DX%(NPX,AX),OY%(NPX,AX)
1250 GCOL 0,RND(7)
1260 PROC_SAMP(AX)
1270 DX%(NPX,AX)=X%(VX)*SX%(AX)
1280 OY%(NPX,AX)=Y%(VX)*SY%(AX)
1290 MOVE DX%(NPX,AX),OY%(NPX,AX)
1300 DRAW 0,OY%(NPX,AX)
1310 DRAW DX%(NPX,AX),0
1320 DRAW DX%(NPX,AX),OY%(NPX,AX)
1330 NEXT
1340 NPX=NPX+1
1350 IF NPX>NX
    THEN NPX=1
1360 UNTIL NOT (INKEY (0))
1370 ENDPROC

```


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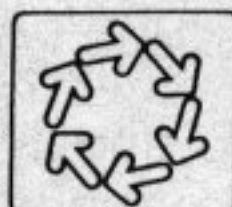
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From Page 81

```

        :PLOT 69,X,Y+4
600 PLOT 69,X+1151,Y
        :PLOT 69,X+1143,Y+4
610 NEXT
620 colour1=colour1+1
        :IF colour1=8
        THEN colour1=0
        :colour2=colour2+1
        :IF colour2=8
        THEN colour2=colour1
630 NEXT
640 VDU 5
        :VDU 29,0;0;
        :GCOL 0,6
        :MOVE 160,160
        :PRINT "Merry Christmas
        "
650 VDU 29,635;550;
        :GCOL 0,7
        :PROCcandles
660
670
680 DEF PROCtree(Xcentre
        ,Ycentre)
690 VDU 29,Xcentre;Ycentre;
700 black=0
        :red=1
        :green=2
        :yellow=3
        :blue=4
        :white=7
710 PROCtriangle(green
        ,-4,3,0,7,4,3)
720 PROCtriangle(green
        ,-5,0,0,4,5,0)
730 PROCtriangle(green
        ,-6,-3,0,1,6,-3)
740 PROCbox(white,-1,-3
        ,1,-3,-1,-4,1,-4)
750 PROCbox(red,-2.5,-4
        ,-1.5,-6,2.5,-4,1.5
        ,-6)
760 ENDPROC
770
780
790 DEF PROCtriangle(colour
        ,X1,Y1,X2,Y2,X3,Y3)
800 GCOL 0,colour
        :PROCmusic
810 MOVE X1*hsize,Y1*vsize
        :MOVE X2*hsize,Y2*vsize
        :PLOT 85,X3*hsize
        ,Y3*vsize
        :ENDPROC
820
830 DEF PROCbox(colour
        ,X1,Y1,X2,Y2,X3,Y3
        ,X4,Y4)
840 GCOL 0,colour
850 MOVE X1*hsize,Y1*vsize
        :MOVE X2*hsize,Y2*vsize
        :PLOT 85,X3*hsize
        ,Y3*vsize
        :PLOT 85,X4*hsize
        ,Y4*vsize
        :ENDPROC
860
870 DEF PROCballs
        :VDU 5
880 FOR vposn=-3*vsize
        TO 7*vsize STEP vsize/3
890 FOR hposn=-6*hsize
        TO 6*hsize STEP hsize/3
900 IF RND(100)>95
        AND POINT(hposn,vposn)=
        green
        THEN MOVE hposn-24
        ,vposn+16
        :GCOL 0,RND(15)
        :PRINT CHR$ 225
        :GCOL 0,white
        :PLOT 69,hposn+16
        ,vposn+8
910 NEXT
        :PROCmusic
        :NEXT
        :ENDPROC
920
930 DEF PROCcandles
940 PROCpiece(white,0
        ,224)
950 PROCpiece(yellow,1
        ,226)
960 PROCpiece(red,1,227)
970 PROCpiece(yellow,1
        ,228)
980 PROCdelay(20)
990 PROCpiece(yellow,1
        ,226)
1000 PROCpiece(red,1,227)
1010 PROCpiece(yellow,1
        ,228)
1020 GOTO 950
1030 ENDPROC
1040
1050 DEF PROCtrunk(X1,X2
        ,Y1,Y2)
1060 GCOL 0,1
        :MOVE X1*hsize,Y1*vsize
        :MOVE X1*hsize,Y2*vsize
        :PLOT 85,X2*hsize
        ,Y1*vsize
        :PLOT 85,X2*hsize
        ,Y2*vsize
1070 GCOL 0,2
1080 FOR X=X1*hsize
        TO X2*hsize+8 STEP 16
1090 MOVE X,Y1*vsize
        :DRAW X,Y2*vsize+4
1100 NEXT
1110 ENDPROC
1120
1130 DEF PROCpiece(colour
        ,offset,char)
1140 offset=offset*32
1150 GCOL 3,colour
        :MOVE -4*hsize-24
        ,3.5*vsize+offset
        :PRINT CHR$ char
        :MOVE 4*hsize-24,3.5*vs
        ize+offset
        :PRINT CHR$ char
        :MOVE -5*hsize-24
        ,.5*vsize+offset
        :PRINT CHR$ char
1160 MOVE 5*hsize-24,.5*vsize
        +offset
        :PRINT CHR$ char
        :MOVE -6*hsize-24
        ,-2.5*vsize+offset
        :PRINT CHR$ char
        :MOVE 6*hsize-24,-2.5*v
        size+offset
        :PRINT CHR$ char
        :ENDPROC
1170
1180
1190 DEF PROCmusic
1200 IF ADVAL (-6)=0
        THEN ENDPROC
1210 READ note$
        :IF note$="END"
        THEN RESTORE 1270
        :GOTO 1210
1220 IF LEFT$(note$,1)=
        "0"
        THEN octave=VAL (
        RIGHT$(note$,1))
        :GOTO 1210
1230 t=VAL (RIGHT$(note$
        ,1))
        :note$=LEFT$(note$
        ,1)
1240 freq=INSTR(octave$
        ,note$)*4+1+48*(octave-
        2)
1250 SOUND 1.1,freq,t*4
        :GOTO 1200
1260 REM * THE FIRST NOWELL
        *
1270 DATA 03,e1,d1,c3,d1
        ,e1,f1,q4,a1,b1,04
        ,c2,03,b2,a2,q4,a1
        ,b1
1280 DATA 04,c2,03,b2,a2
        ,q2,a2,b2,04,c2,03
        ,q2,f2,e4,e1,d1,c3
        ,d1,e1,f1
1290 DATA q4,a1,b1,04,c2
        ,03,b2,a2,q4,a1,b1
        ,04,c2,03,b2,a2,q2
        ,a2,b2
1300 DATA 04,c2,03,q2,f2
        ,e4,e1,d1,c3,d1,e1
        ,f1,q4,04,c1,03,b1
        ,a4,a2,q6,04,c2,03
1310 DATA b2,a2,q2,a2,b2
        ,04,c2,03,q2,f2,e8
1320 REM *0 COME ALL YE
        FAITHFUL *
1330 DATA q2,q4,d2,q2,a4
        ,d4,b2,a2,b2,04,c2
        ,03,b4,a2,q2
1340 DATA q4,F#2,e2,F#2
        ,q2,a2,b2,F#4,e3,d1
        ,d8,04,d4,c2,03,b2
        ,04,c4,03,b4
1350 DATA a2,b2,q2,a2,F#3
        ,e1,d2,q2,q2,F#2,q2
        ,a2,q4,d2,b2,b2
1360 DATA a2,b2,04,c2,03
        ,b4,a2,b2,04,c2,03
        ,b2,a2,q2,F#4,q2,04
        ,c2,03,b4,a3,q1,q8
1370 REM *WHILE SHEPHERDS
        WATCH*
1380 DATA f2,a3,a1,q2,f2
        ,A#2,A#2,a2,q2,a2
        ,04,c2,c2,03,b2,04
        ,c6,03,a2,04,d3,c1
1390 DATA 03,A#2,a2,q2
        ,f2,e2,a2,q2,f2,f2
        ,e2,f8
1400 REM *SILENT NIGHT*
1410 DATA q3,a1,q2,e6,q3
        ,a1,q2,e6,04,d4,d2
        ,03,b6,04,c4,c2,03
        ,q6,a4,a2,04,c3,03
1420 DATA b1,a2,q3,a1,q2
        ,e6,a4,a2,04,c3,03
        ,b1,a2,q3,a1,q2,e6
        ,04,d4,d2,f3,d1,03
1430 DATA b2,04,c6,e6,c2
        ,03,q2,e2,g3,f1,d2
        ,c9
1440 DATA END
1450 DEF PROCdelay(t)
        :T=TIME +t
        :REPEAT PROCmusic
1460 UNTIL TIME >T
        :ENDPROC
1470 END

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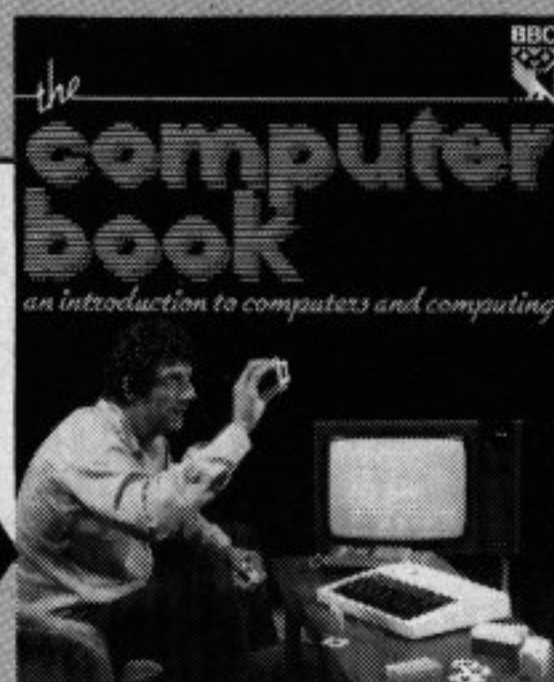
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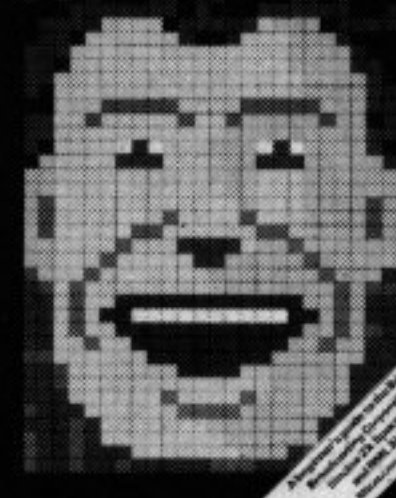
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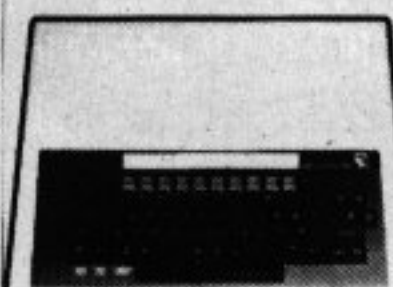
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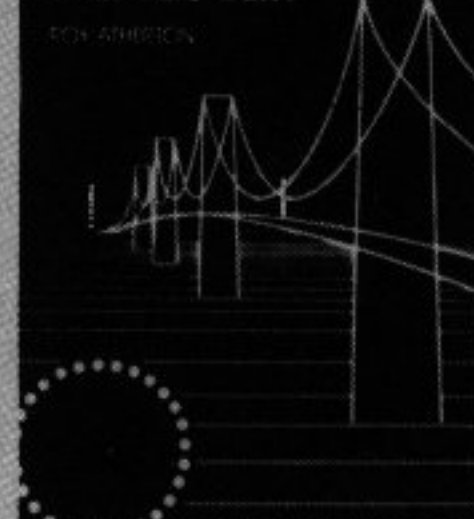
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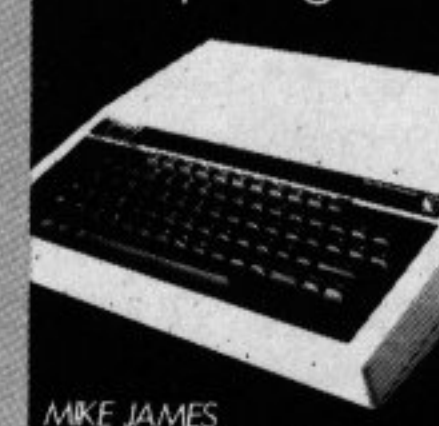
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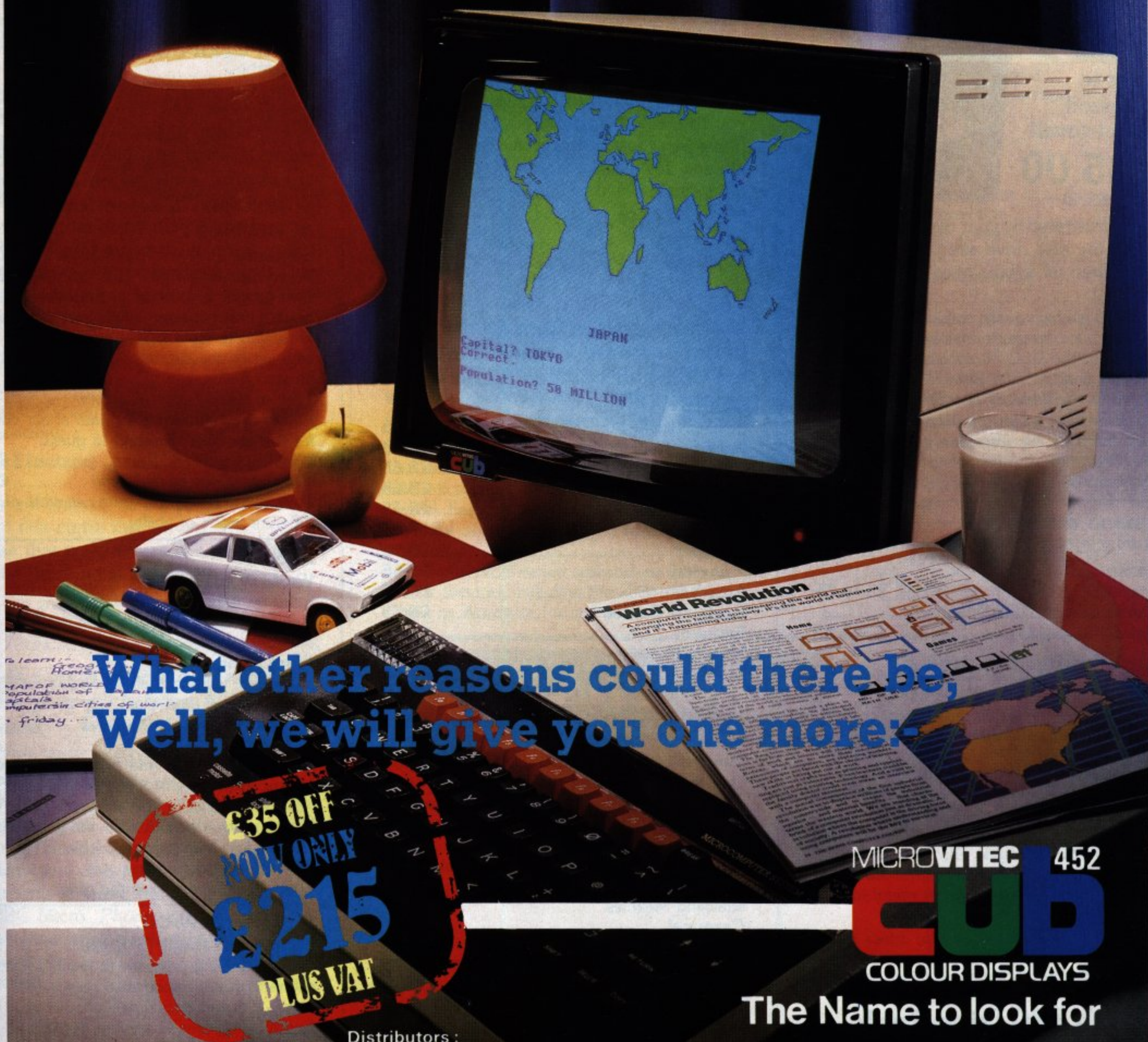
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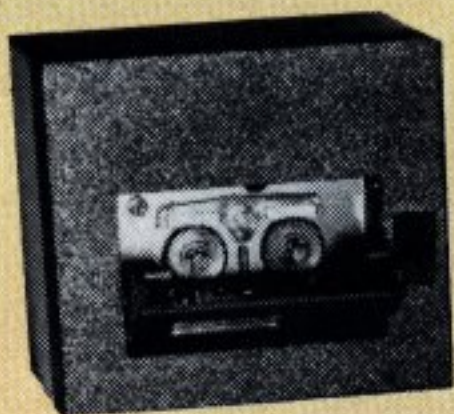


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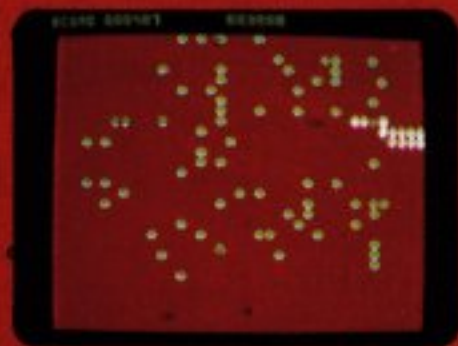
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From Page 55

```

10 REM *****
*****
20 REM * TOWER BRIDGE
   GAME *
30 REM * *
40 REM * Designed by
   *
50 REM * *
60 REM * P. BIBBY *
70 REM * *
80 REM * Program by *
90 REM * *
100 REM * ZEN *
110 REM * *
120 REM * (c) 1983 *
130 REM * THE MICRO USER
   *
140 REM * *
150 REM *****
*****
160 PROCinit
170 ON ERROR PROCerr
180 REPEAT
190 MODE 7
200 PROCinstruct
210 M%=3
   :S%=0
   :no%=1
220 REPEAT
230 MODE 1
240 VDU 23,0,8202;0;0;0;
250 PROCsetup
260 PROCscreen
270 PROCbridge
280 VDU 5
290 PROCman
300 FOR N%=0 TO 2
   :PROCquard
   :NEXT
310 REPEAT
320 *FX15,1
330 IF POINT(X%+20,Y%-36)=0
   AND (X%<>3520R X%<>864)
   PROCfall(16,0)
340 IF POINT(X%+16,Y%-46)=1
   SOUND &11,2,20,255
   :PROCfall(3,1)
   :A%=1
350 IF POINT(X%+16,Y%-4)=1
   AND C%=1SOUND &12
   ,2,120,255
   :C%=0
   :D%=D%+1
   :VDU 4
   :PRINT TAB(30,1)" "
   :VDU 5

```

```

360 K%=INKEY (0)
   :IF K%<>-1PROCmanmove
   :C%=1
370 IF TIME MOD 800<10up%=1
   :MOVE X%,Y%+28
380 IF up%PROCraise(8)
   :GCOL 3,3
390 IF U%>1AND up%=0
   :VDU 96
   :VDU 4
400 PROCthink
   :PRINT TAB(30,1)"£"
410 UNTIL T%=11 OR A%
   :VDU 5
420 IF A% PROCdead
590 IF X%=32AND Y%=323
   AND C%=1SOUND &13
   ,2,60,255
   :C%=0
   :VDU 4
   :S%=S%+10
   :PRINT TAB(30,1)" "
   TAB(T%,25)"£"TAB(14
   ,1);S%
   :VDU 5
   :T%=T%+1
600 SOUND &11,-10,120
   ,1
610 PROCman
620 ENDPROC
630 DEF PROCfall(V%,W%)
640 SOUND &11,1,220,200
   :nc%=6
   :REPEAT
   :Y%=Y%-V%
   :PROCman
   :UNTIL POINT(X%+16
   ,Y%-36)<>W%
   :SOUND &10,-15,6,1
   :SOUND &11,0,0,0
650 DEF PROCman
660 GCOL 3,2
   :MOVE X%,Y%
   :VDU 224+nc%
670 MOVE 1x%,1y%
   :VDU 224+oc%
680 oc%=nc%
   :1x%=X%
   :1y%=Y%
690 ENDPROC
700 DEF PROCthink
710 N%=(N%+1)MOD no%
720 ON N%+1 GOSUB 820
   ,840 ,830 ,830 ,850
   ,840

```

```

730 PROCquard
740 ENDPROC
750 DEF PROCquard
760 GCOL 3,3
770 MOVE X%(N%),Y%(N%)
   :VDU 233
780 MOVE OX%(N%),OY%(N%)
   :VDU 233
790 OX%(N%)=X%(N%)
   :OY%=Y%(N%)
800 IF POINT(X%(N%)+4
   ,Y%(N%)+16)=1AND D%>0
   SOUND &13,2,20,255
   :D%=D%-1
   :MOVE X%(N%),Y%(N%)+28
   :GCOL 3,3
   :VDU 96
810 ENDPROC
820 X%(N%)=X%(N%)+32
   :IF X%(N%)>1248X%(N%)=8
   64
   :RETURN
   :
   ELSE RETURN
830 X%(N%)=X%(N%)-32
   :IF X%(N%)<416X%(N%)=83
   2
   :RETURN
   :
   ELSE RETURN
840 X%(N%)=X%(N%)-32
   :IF X%(N%)<OX%(N%)=320
   :RETURN
   :
   ELSE RETURN
850 X%(N%)=X%(N%)+32
   :IF X%(N%)>1248X%(N%)=9
   28
   :RETURN
   :
   ELSE RETURN
860 DEF PROCraise(R%)
870 IF U%>90AND R%=8up%=0
   :ENDPROC
880 PROCbridge
   :U%=U%+R%
   :PROCbridge
890 ENDPROC
900 DEF PROCbridge
910 GCOL 3,3
920 MOVE 416,444
   :DRAW 639-U%,444+U%
   :DRAW 639-U%,476+U%
   :DRAW 416,476
   :MOVE 832,444

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

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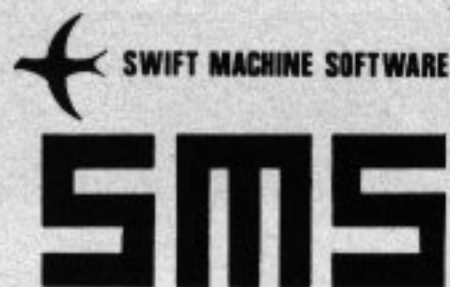
From Page 127

```

:DRAW 640+U%,444+U%
:DRAW 640+U%,476+U%
:DRAW 832,476
930 ENDPROC
940 DEF PROCscreen
950 VDU 19,1,4;0;19,2
    ,2;0;19,3,3;0;
960 COLOUR 130
    :VDU 28,0,31,39,29
    ,12
    :COLOUR 129
    :VDU 28,0,2,39,0,12
    ,26
970 COLOUR 128
    :PRINT TAB(8,1)"Score:"
    ;SZTAB(24,1)"Cargo:"
    "TAB(16,30)"Level:";no%
980 PROCtower(10,4)
990 ENDPROC
1000 DEF PROCtower(AZ,BZ)
1010 LOCAL XZ,YZ
1020 COLOUR 129
    :VDU 28,13,25,25,23
    ,12
    :COLOUR 130
    :VDU 28,0,25,12,23
    ,12,28,26,25,39,23
    ,12,26
1030 COLOUR 128
1040 FOR XZ=0TO 2
    :FOR YZ=0TO 18
1050 PRINT TAB(XZ+AZ,YZ+BZ)
    CHR$(224);TAB(XZ+16+AZ
    ,YZ+BZ)CHR$(224)
1060 NEXT YZ
    :NEXT XZ
1070 COLOUR 1
    :FOR XZ=9TO 29
    :PRINT TAB(XZ,6)
    CHR$(232)
    :NEXT
1080 COLOUR 131
    :VDU 28,0,17,12,17
    ,12,28,27,17,39,17
    ,12,26
    :COLOUR 128
1090 FOR YZ=4TO 22
    :PRINT TAB(11,YZ)
    CHR$(225);TAB(27
    ,YZ)CHR$(225)
    :NEXT
1100 VDU 4
    :COLOUR 129
    :COLOUR 2
    :PRINT TAB(1,15)"£"
    TAB(38,21)"£"TAB(38
    ,15)"£"TAB(14,4 )"£"
    TAB(24,4)"£"TAB(14
    ,15)"£"TAB(8,15)"£"
    TAB(30,15)"£"TAB(24
    ,15)"£"TAB(30,21)"£"
    TAB(8,21)"£"TAB(0
    ,20)"Bank"
1110 COLOUR 3
    :PRINT TAB(0,1)
    STRING$(M%,CHR$(226))
    :COLOUR 128
1120 ENDPROC
1130 DEF PROChead
1140 FOR nZ=0TO 1
    :PRINT TAB(10,0+nZ)
    CHR$(157)CHR$(132)
    CHR$(141)"Tower Bridge
    "CHR$(156)
    :NEXT
1150 PRINT TAB(14,3)
    CHR$(130)CHR$(136)
    "by ZEN"TAB(16,5)"HI:";
    hi%
1160 ENDPROC
1170 DEF PROCinstruct
1180 PROChead
1190 PRINT TAB(14,10)
    CHR$(131)"A = Up"
    TAB(14,13)CHR$(131)
    "Z = Down"TAB(14
    ,16)CHR$(131)"< =
    Left"TAB(14,19)
    CHR$(131)"> = Right"
1200 PRINT TAB(0,24)"<RETURN
    > for INSTRUCTIONS
    <SPC> to PLAY";
1210 *FX15,1
1220 REPEAT G=GET
    :UNTIL G=32 OR G=13
1230 IF G=13 PROCtell
1240 ENDPROC
1250 DEF PROCtell
1260 CLS
    :PROChead
    :PRINT "As custodian
    of the Tower of London
    you""are rather supri
    sed one night when
    the""treasures vanish
    They were taken by
    the Tower ghosts.
    Your job is to get""
    "them all back to the";
1270 PRINT " bank. To collec
    t a treasure all you
    have to do is run
    underthe ""£"" signs.
    The treasure will
    then beaded to the
    cargo display. By
    running""into the
    bank you can deposit
    your loot.";
1280 PRINT "The ghosts canno
    t kill you but if they"
    "catch you while you
    are carrying a""treas
    ure the will almost
    certainly ""steal
    it back and stash
    it somewhere""else.
    Each time you complete
    a wave the next one
    have more ghosts."
1290 PRINT "Watch out for
    the BRIDGE and the
    THAMES";
1300 PRINT TAB(10,24)"Press
    <SPC> to PLAY";
1310 *FX15,1
1320 REPEAT UNTIL 32=
    GET
    :ENDPROC
1330 DEF PROCinit
1340 DIM XZ(5),YZ(5),OXZ(5)
    ,OYZ(5)
    :hi%=300
1350 *FX12,1
1360 *FX11,1
1370 ENVELOPE 1,0,-2,0
    ,0,200,0,0,127,0,0
    ,0,126,0
1380 ENVELOPE 2,0,-230
    ,230,-230,5,5,5,127
    ,-1,0,0,126,0
1390 VDU 23,224,&B6,&B6
    ,0,&5B,&5B,0,&B6,&B6
1400 VDU 23,225,&FF,&81
    ,&81,&81,&FF,&81,&81
    ,&81
1410 VDU 23,226,24,24,16
    ,254,16,28,116,70
1420 VDU 23,227,24,24,16
    ,254,16,208,112,24
1430 VDU 23,228,24,24,8
    ,127,8,11,14,24
1440 VDU 23,229,24,24,8
    ,127,8,56,46,98
1450 VDU 23,230,90,90,126
    ,24,24,126,66,66
1460 VDU 23,231,0,0,0,255
    ,255,126,126,60
1470 VDU 23,232,255,129
    ,131,133,137,145,161
    ,255
1480 VDU 23,233,24,60,90
    ,255,219,66,126,36
1490 ENDPROC
1500 DEF PROCsetup
1510 lx%=-32
    :ly%=-32
    :XZ=32
    :YZ=323
    :oc%=3
    :nc%=3
    :Z%=3
    :UZ=1
    :AZ=0
    :CZ=0
    :DZ=0
    :up%=0
1520 XZ(0)=1280
    :XZ(1)=-32
    :XZ(2)=1280
    :YZ(0)=323
    :YZ(1)=515
    :YZ(2)=867
1530 XZ(3)=1280
    :XZ(4)=-32
    :XZ(5)=-32
    :YZ(3)=515
    :YZ(4)=515
    :YZ(5)=323
    :TZ=0
1540 FOR NZ=0TO 5
    :OXZ(NZ)=XZ(NZ)
    :OYZ(NZ)=YZ(NZ)
    :NEXT
1550 ENDPROC
1560 DEF PROCerr
    :IF ERR =17ENDPROC
1570 *FX12,0
1580 *FX12,3
1590 VDU 4
    :REPORT
    :PRINT " In line "ERL
1600 END

```

This listing is included in this month's cassette tape offer. See order form on Page 99.



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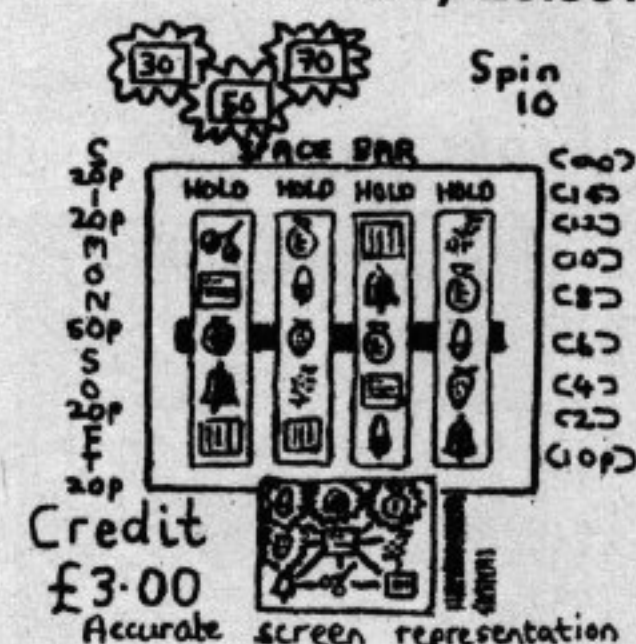


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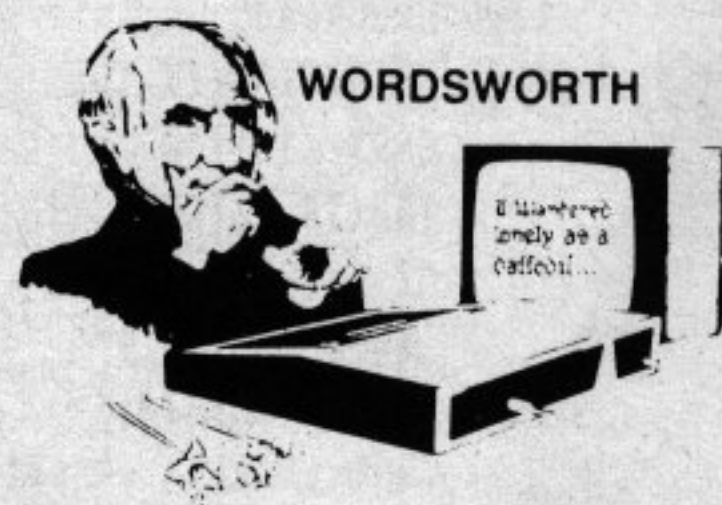
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THREE cheers for Christopher Hester, who in October's Micromail exposed the naked king of over-precious structured programming!

What in the world is so sacrosanct about a PROC? Why the lumbering PROC . . . DEFPROC . . . ENDPROC when a plain honest GOSUB . . . RETURN does the job in half the time, is easily traceable and is just as readily debuggable?

Your program structure shouldn't suffer a whit by a GOSUB: GOSUBs are quick and nimble, whereas PROCs are heavy, fat and sanctimonious.

The only advantage in using PROCs lies in their control variable facility, and if you don't want a control variable (as most people don't) then why leave the nippy GOSUB languishing, discredited, in the wings?

And while we're on the subject, why all this pious claptrap about using TRUE and FALSE, when a simple 1 or 0 flag is far more easy to use?

Or at least it would be if the Acorn compilers were not so waywardly silly as to insist on a -1 value for TRUE, thus denying us the quick and easy IF x . . . and IF NOT x . . . clauses.

These poor brainwashed Beeb programmers have been misled into considering it a point of honour not to include a single GOTO or GOSUB in their listings.

What a pathetically self-righteous and hypocritical attitude! We are interested in what programs DO, not in delivering pats on the head for the handwriting. — David Bye, Saffron Walden, Essex.

Squaring things up

I HAVE bought your magazine since it first appeared, and have found it very helpful.

So perhaps I can help some

No plaudits for handwriting . . .

of your readers with the problem of "NO ROOM" in the King Kong and Deathwatch programs. I also fell into the trap of creating unwanted spaces that took up memory. I then obtained the following short program that will list all extra spaces including the essential ones.

First list your program to screen and then type the following:

```
MODE6:VDU19,0,1,0,0,0:VDU23,
32,255,255,255,255,255,255,2
55,255
```

Then press Return. The listing starting at the beginning will now appear with squares making the spaces and all unwanted ones can be removed by the aid of the copy key.

You will be amazed at the number of spaces that creep in and are not required. — S.H. Gereham, Romford.

Lost programs

I HAVE several enquiries which I hope you may be able to answer. They are all intriguing and could well be of interest to other readers.

The first problem arose when I bought for my school a piece of software which I spent the whole weekend trying to list. It loaded all right and then ran. (I typed LOAD, etc rather than CHAIN.)

When I typed LIST, the screen went blank. I used an assembly language retrieval program — nothing.

I tried to list only certain sections — nothing. I tried to delete certain lines — nothing.

Eventually the program was lost and I reloaded it.

After abortive attempts to list, anything I pressed gave "Bad Program". What intrigues me is how they do it? I want to learn rather than infringe copyright!

Secondly, I have heard that transferring programs from cassette to disc can be awkward. I should think that for long programs, needing to be loaded at &E00, it would prove rather difficult. So how is it done?

Thirdly, I read often that certain memory locations contain certain information. How can I find out what's where?

For example, in the November issue, one of your correspondents writes that information on which mode one is in is contained in location &367. How can you find out these things?

Lastly, could you explain what VDU23 does — apart from turning the cursor on and off and re-programming display characters.

Then again, what about VDU23,9;16;0;0; or whatever?

Could we have a comprehensive list of all possible VDU23 commands?

Oh yes — what about an article on GCOL1, 2 & 3!

Needless to say, an excellent magazine. — Graham Conridge, London.

● The software protection method you describe is caused by entering control codes into REM statements. For obvious reasons we cannot give more details.

The problems of transferring cassette to disc were fully covered in Peter Walker's article in the August issue of Micro User.

I suggest the Advanced User Guide and our back issues as sources of information on memory locations, and also on VDU23.

This command can be used in two ways to create user defined characters, or to directly program the 6845 — details of which we shall be giving in forthcoming articles.

We're also going to feature soon the uses of GCOL 1, 2 and 3.

rqForth

I WAS delighted to find Chris Martin's lengthy review of Level 9's rqForth in your November issue and was glad that he seems to like it (once I'd tracked down his opinions among the inevitable paragraphs on Forth history, etc!).

Readers may be interested to learn that all copies of rqForth sold since Easter have included versions for both cassette and disc (with a free 30 page disc supplement in addition to the normal manual). — Pete Austin, High Wycombe.

Skeleton unearthed

AFTER reading about Acorn's most generous advice to its rival software houses about indirectly addressing the screen and how this programming activity will lead to incompatibility with the second processor (if it ever arrives, that is), I was wondering how Acornsoft managed to obtain the speed required for their Super Invaders.

After many long nights bent


```

10DEFPROCpron
20CLS
30FORA=11TO12
40PRINTTAB(12,A)CHR$141CHR$134CHR$136"Printing"
50NEXT
60VDU28,0;0;:REM Zero Text Window
70VDU2
80VDU23,1,0;0;0;0;:REM Switch off cursor
90ENDPROC
120DEFPROCproff
130VDU3
140VDU26:REM Restore Text Window
150VDU23,1,1;0;0;0;:REM Restore cursor
160CLS
170ENDPROC

```

Listing I

simply enter PROCpron or PROCproff instead of VDU2 or VDU3. (Listing I.)

For anyone who already has a large program and does not wish to edit all the VDU2 and VDU3 calls, I also enclose a

```

10A%=?&20E+256*?&20F
20FORA=0TO1
30P%=&D01
40[OPTA
50CMP£2
60BNEnext
70LDA£12:JSRA%
80LDA£28:JSRA%
90LDA£0:JSRA%:JSRA%:JSRA%:JSRA%
100LDA£2:JSRA%
110.next
120CMP£3
130BNEnone
140LDA£3:JSRA%
150LDA£26
160.none
170JMPA%
180]
190NEXT

```

Listing II

machine code patch which will detect any VDU2 call, clear the screen and set up a zero text window. (Listing II.)

A VDU3 call will reset the text window to the default. The patch is presently assembled at &D01.

Anyone with a disc drive will need to use another section of RAM. To activate the patch use ?&20E =1 : ?&20F=&D. In this case the cursor remains, although it could be removed with extra lines of code if required.

BREAK will deactivate the patch, as will POKEing the original contents back into &20E and &20F. These values may vary for different operating systems, and should be determined for individual machines. Incidentally, if storing the program anywhere other than &D01, the activation addresses should be changed accordingly. — Peter Vasey, South Shields.

Tiny Problem

HERE is our computer game idea: The computer is the dog and you are the frog.

The dog chases the frog, but you can get away by jumping over the dog and score points by jumping on a lily pad — about 100 points. You have four lives.

It has three screens and on each screen there gets less and less lily pads. On the third lot you have three lily pads — two green and one red which is home and scores 500 points.

You have 1000 units of energy to get through each lot.

We do not know how to write this game in Basic. Please could someone do it for us? — Sharon King, age 8½, Paul King, age 6½.

● Is there anyone out there who could program Sharon and Paul's idea for them? If so, get in touch with Micro User!

Structure strictures

MAY I reply to Christopher Hester's points and questions about structured programming (Micro User, October, 1983).

First, a general point. BBC Basic is not fully structured and it is true that complete adherence to the rules of good structure produces more procedures than one would choose.

I can give details of methods for getting the procedures in a reasonable order, perhaps soon in this journal. But at least when searching for a procedure one is searching for a properly named chunk of code with a beginning and end.

Most of Mr Hester's problems arise because of faults in BBC Basic which one hopes are just part of the long history of the development of languages.

A change of graphics mode should be possible in a procedure. It is a problem the software writers did not solve properly. The same comment applies to any other action command. They should work in procedures or in the main program equally well.

The reasons why GOTO and GOSUB are still included are complex and different. GOSUB is there for compatibility with old practices and possibly as a cover for technical shortcomings.

No modern language would be designed with GOSUB included for its own sake.

GOTO has the same justifications and one more. There are certain complex situations, such as the need to cope with an error discovered at a deeply nested point in a program, when a GOTO is the simplest way to cope. Used carefully by an expert there is no problem.

But as a teacher I know from bitter experience the trouble which GOTO causes.

For students and beginners it should be completely avoided and even Mr Hester need not use it for the input routine he mentions. A standard structure for handling keyboard input is:

REPEAT

(get the data)

UNTIL (data is correct)

It would be easy for people to list their personal preferences but the concepts of SP are the result of wide consensus and more than a decade of hard won progress.

BBC Basic is good enough (only just) to enable its users to work in a sensible modern conceptual framework within which problems can be solved and tasks completed in efficient, readable ways.

Any reader is free to reject or accept this philosophy, but I do get upset when I see the old discredited methods being taught to unsuspecting children or other newcomers to computing. Why does Mr Hester think SP was invented? — Roy Atherton, Director, Bulmershe Computer Education Centre, Reading.

Answer in stereo

READING of the continuing interest in tape loading problems I thought that some readers might benefit if I related my own experiences in this troublesome area.

For my first attempts at tape loading I used my "quality" mains powered stereo tape deck with built in amplifier (output impedance 10kohms, input 560 kohms).

Acorn's letter in the October issue of Micro User showed that I had no chance of success. I then bought a cheap portable and now, being as wise as the Beeb Owl, asked for a demo to be sure that it worked.

The dealer promptly loaded up Planetoids — no problem.

From Page 133

On my return home however I discovered that there was no record level control and the auto level was too high. Programs unloaded to tape could not be loaded back onto the computer.

My way round that one was to re-record onto my mains recorder adjusting the record level appropriately.

Well, as you might guess all this infuriated my wife. The tape deck went back to the dealer and we bought a pair of disc drives.

If you promise to keep a secret from more understanding wives I have now discovered that if I record onto the stereo deck via the microphone input (low impedance) and carefully output via the speaker channels (6w) there's no trouble at all!

It's just as well Acorn were

a little slow in writing to you. —
Lex Harrison, Edinburgh.

Missing

THANKS for a great magazine but in your listing for your date of birth program in the October issue you missed a line out and the program would not run. There should have been a line number 35 PROCinit. —
Matthew Searle, age 11.

● Quite correct Matthew — the missing line is on the floor somewhere in our art room!

Mystery

CAN you help me with two problems?

Why does shift and break produce the message:

BBC Computer
Searching
File not Found
BASIC
>_

While disassembling the Basic I ROM I found the command LINE. Could you please tell me what this does? —
Ben Dessau, Rottingdean.

● On machines fitted with a DFS, pressing break and shift, then releasing break while maintaining shift causes the micro to *EXEC a file on the disc with the title !BOOT (provided the disc has been prepared with *OPT 4 3).

Often !BOOT simply chains in a menu program.

If you haven't got a DFS, you obtain the message you described on OS1.2. On OS0.1 you simply obtain a normal break.

*LINE and *CODE allow you to jump to your own machine code routine pointed at by a vector at &200,&201 (the user vector USERV).

*CODE is followed by two parameters which are placed in the X and Y registers. It is entered with the accumulator

equal to zero.

*LINE is followed by a string, the start of which is vectored by X and Y. It is entered with the accumulator equal to 1.

Crash catcher

TO make your BBC Micro print the line at which an error occurs when it crashes, the following can be used (with OS 1.0 or later):

```
10 ON ERROR REPORT:PRINT"  
at line";ERL: PROCinsert("L  
IST"+STR$(ERL)+CHR$13):STOP  
10000 DEFPROCinsert(I$):REPE  
AT:A%=138:X%=0:Y%=ASC(LEFT$(  
I$,1)):CALL&FFF4:I$=RIGHT$(I  
$,LEN(I$)-1):UNTIL I$="":END  
PROC
```

— David Stonebanks, Stevenage.

And finally, with tongue firmly in cheek . . .

Trevor's micro finally makes the grade . . .

Dear Trev,

I've finally done it. I've summoned up the nerve to take my micro down to the Nice Byte and get my new ROM fitted. So, instead of being just a 0.1 plebian, I am now the proud owner of a 1.2 Operating System.

Mind you, it was a nerve wracking experience. First of all I had to get my Beeb downstairs to the car. This entailed a half hour struggle with the tangle of wires and flexes that had built up over the past six months. It was while I was doing this that I came across a plug that actually didn't do anything! I've no idea how it got there or what it was supposed to do.

Andrea was nice enough to drive me and my Beeb down to the shop though she couldn't help showing her nature. By habit I sat in the front of the car.

"Shouldn't you be sitting in the back, dear?" she asked with an air of innocence. "I mean didn't they just change the law or something?"

I ignored the remark and she referred

to my British Broadcasting Micro as "the little bundle" all day.

When I got to the Nice Byte she came in with me and demanded that the salesman explain exactly what was going to happen. He waxed eloquent and made it sound like a brain transplant.

"Never mind the micro", she said pointing at me, "give him a new ROM".

The salesman gave me a fellow sufferer kind of look and told me that if I waited it would be "all over" in 10 minutes.

Well, it was the longest ten minutes of my life. I swear that as soon as my micro disappeared into the back of the shop I started having withdrawal symptoms. You know, anxiety, blurred vision, sweating. Without thinking about it I started pacing up and down.

"Don't worry, dear, I'm sure that they'll use an anaesthetic", Andrea murmured, working her way through the books, complaining about the prices.

It was a relief when my micro arrived back on the counter.

"Is it a boy or a girl?" Andrea asked the confused assistant.

"It's an OS 1.2 and that'll be £11", he replied.

At this point Andrea, who hadn't realised that I was going to have to pay, started to become a cross between M. Thatcher and H. Ogden, both at their best (or do I mean worst). I can't remember exactly what it was that she said (I was in a corner pretending to look at some software).

I do, however, distinctly remember her mentioning the "Sale of Goods Act, 1893" and Esther Ransom in the same breath.

Anyway, it did no good. I took out my cheque book and paid. As I walked out of the door the salesman grinned wickedly and yelled out: "See you when you get Basic Two".

Andrea's still asking me just what Basic Two is and I'm running out of lies. I wish that I'd stayed with my 0.1 ROM. I enjoyed playing the cassette bugs fix!

Yours in adversity,

Bob

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CS3 - NURSERY RHYMES. Especially for the very young members of the family. This suite of programs is designed for the pre-school child. The nursery rhyme tune is played with the words appearing across the top of the screen two lines at a time whilst a full colour animated picture is displayed. The colours can be changed by pressing the function keys. Five rhymes are provided, Hickory Dickory Dock, Polly put the kettle on, See Saw Margery Daw, Humpty Dumpty and Ba Ba Black Sheep - all for £2.99

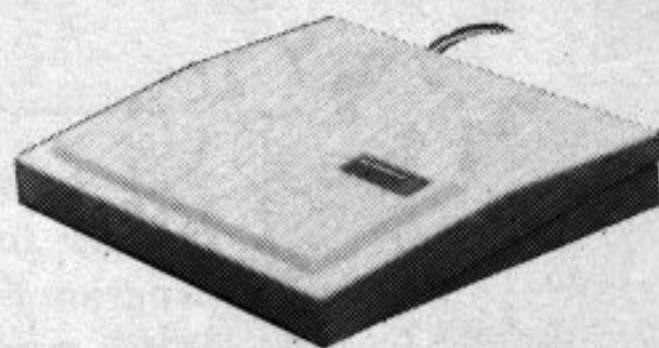
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BBCM-1

From Page 75

```

10 REM (c) MICRO USER 1983
20 VDU 23,240,1,0,0,0,1,1,60,114
   ,23,241,72,200,80,112,208,240
   ,115,4,23,242,0,0,15,17,33,194
   ,4,2,23,243,0,0,128,0,0,0,0
   ,0,23,244,241,112,62,3,0,0,0
   ,0,23,245,248,0,31,255,63,15
   ,7,3,23,246,2,4,248,192,192
   ,128,192,248
30 VDU 23,224,64,172,84,16,16,255
   ,16,16,23,225,0,0,0,239,239
   ,0,239,239,23,226,0,3,30,126
   ,31,0,0,0,23,227,126,255,66
   ,66,255,255,90,0,23,228,0,192
   ,120,126,248,0,0,0,23,229,0
   ,0,1,3,6,14,25,54,23,230,112
   ,224,128,196,238,52,8,168
40 VDU 23,231,35,3,3,3,15,123
   ,195,23,232,88,160,0,0,0,192
   ,60,6,23,233,42,19,10,12,62
   ,246,255,15,23,234,128,0,0,0
   ,0,0,0,252,23,235,7,7,7,15,19
   ,34,4,8,23,236,255,255,254,54
   ,27,9,18,36,23,237,0,56,37,61
   ,37,37,56,0
50 VDU 23,238,0,198,41,41,41,41
   ,198,0,23,239,0,68,124,84,84
   ,68,68,0
60 VDU 23,247,60,60,60,24,126,189
   ,189,60,23,248,0,119,68,70,84
   ,119,0,0,23,249,0,119,37,37
   ,37,39,0,0,23,250,0,119,68,102
   ,68,68,0,0
70 DIM HQ%(4)
   :DIM HI%(4,1)
   :DIM HI$(4)
   :FOR NZ=0 TO 4
   :HI$(NZ)="BBC"
   :HI%(NZ,1)=100
   :NEXT
80 ON ERROR GOTO 910
90 PROCINSTRUCTIONS
100 ENVELOPE 1,1,-1,-1,-1,100,100
   ,100,0,0,0,-1,V1%,0
   :ENVELOPE 2,1,0,0,0,10,10,10
   ,1,-1,-1,-1,-1,V1%,0
   :ENVELOPE 3,1,0,0,0,1,1,1,-1
   ,1,-1,-1,-3,V1%,0
110 MODE 1
   :VDU 5,23;8202;0;0;0;
120 SC%=0
   :DEL%=0
   :TP%=0
   :COX=FALSE
   :BAPRES%=20
   :MILOC%=0

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```

   :PLRG%=10
   :MHZ=2
130 PROCINIT
140 FOR NZ=0 TO 3
   :VDU 19,NZ,0,0,0,0
   :NEXT
   :PROCSCREEN
   :IF TP%>0TP%=TP%-1
   :DEL%=DEL%-1
   :PROCDEL
150 IF MIAZPROCMI
160 PROCSDO
   :IF MIAZPROCMI
170 PROCTM
   :PROCMI
   :IF PRZPROCPRMD
   ELSE PROCDELAY(3)
180 IF CO%GOTO 530
   ELSE IF QZ=0GOTO 230
   ELSE IF PRES%=0GOTO 280
190 IF LIGZ<>0LIGZ=LIGZ-1
   :IF LIGZ=0PROCWINDOW(-1)
200 IF INKEY (-74)T=TIME
   :REPEAT UNTIL TIME =T+30
   :REPEAT UNTIL INKEY (-74)
210 GOTO 150
220 DEF PROCPLSET
   :MIAZ=0
   :RP%=1200
   :RP2%=500
   :ENDPROC
230 VDU 4
   :CLS
   :IF DEL%/TP%<0.6GOTO 260
   ELSE PRINT TAB(6,10);"A successful
   delivery run !"
240 PRINT "TAB(5);"Bonus points
   100 x ";PRDES%";" = ";100*PRDES%
   :SCX=SCX+100*PRDES%
   :BAPRES%=BAPRES%-1-1*(BAPRES%=14)
250 PROCTUNE(1)
   :PROCDELAY(200)
   :CLS
   :VDU 5
   :GOTO 130
260 PRINT TAB(7,10);"Hard luck chum
   - you waste"TAB(7);"almost
   as many presents as"TAB(13);
   "you deliver !"

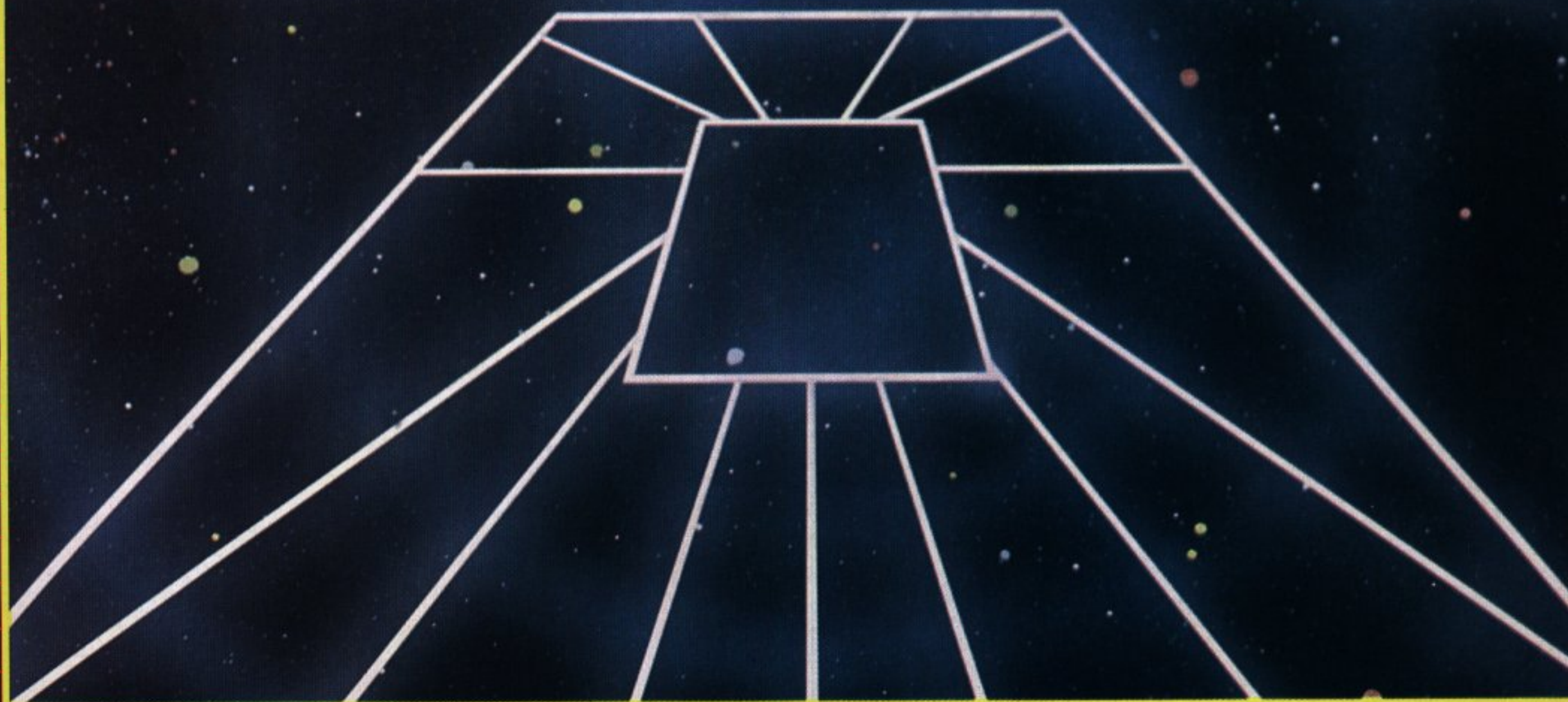
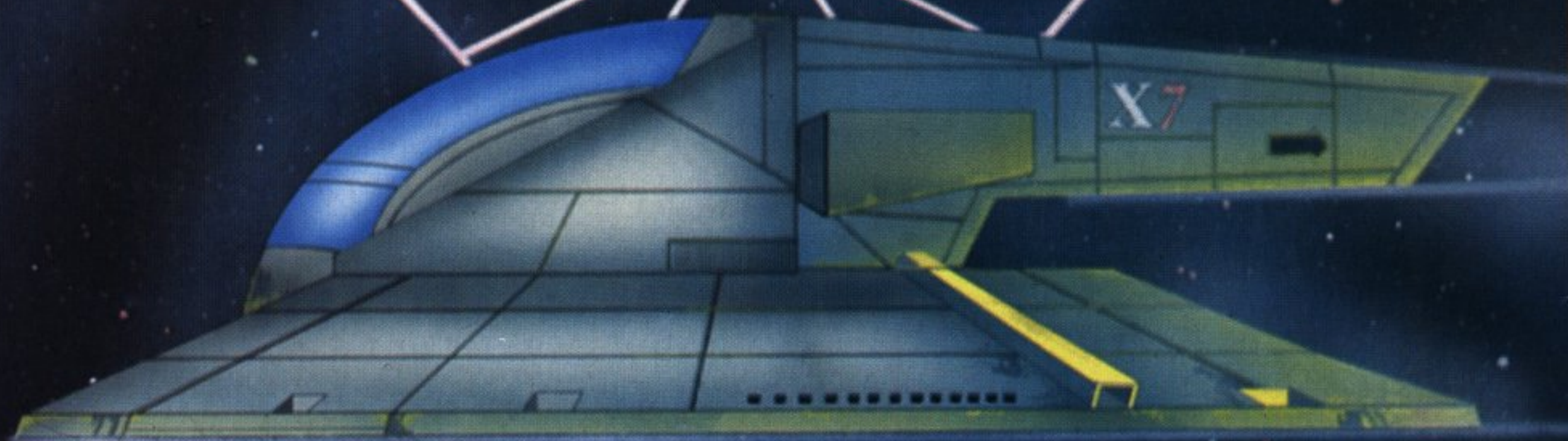
```

```

270 PROCTUNE(2)
   :PROCDELAY(100)
   :GOTO 530
280 VDU 4
   :PRINT TAB(8,10);"Idiot - you've
   run out of"TAB(14);"presents"
   :GOTO 270
290 DEF PROCSDO
   :GCOL 0,0
   :MOVE X%,Y%
   :VDU 226,227,228
   :XZ=XZ+16*(INKEY (-98))-16*(
   INKEY (-67))-16*(XZ<0)+16*(XZ>994
   )
   :YZ=YZ-16*(INKEY (-73))+16*(
   INKEY (-105))+16*(YZ>800)-16*(YZ<
   400)
   :MOVE X%,Y%
   :GCOL 0,2
   :VDU 226,227,228
   :IF INKEY (-99)AND PRZ=0PROCPRDR
300 ENDPROC
310 DEF PROCPRDR
   :PRZ=-1
   :PRX%=XZ+36
   :PRY%=YZ-32
   :SOUND 11,1,255,25
   :ENDPROC
320 DEF PROCPRMD
   :MOVE PRX%,PRY%
   :VDU 18,0,0,224,8,225
   :PRY%=PRY%-16
   :MOVE PRX%,PRY%
   :VDU 18,0,1,224,8,18,0,3,225
   :POZ=POINT(PRX%,PRY%-36)
   :PO2Z=POINT(PRX%+32,PRY%-36)
   :IF POZ<>0OR PO2Z<>0GOTO 330
   ELSE ENDPROC
330 MOVE PRX%,PRY%
   :VDU 18,0,0,224,8,225
   :PRZ=0
   :PROCPRZ
   :IF PRY%>300DEL%=DEL%-1
   :PROCDEL
   :ENDPROC
   ELSE IF POZ=1AND PO2Z=1AND HQZ(
   INT (PRX%/210))<4AND HQZ(
   INT (PRX%/210))<>0SOUND 3,2
   ,100,1
   :PROCDEL
   :PROCSCORE(100)
   :PROCPRND(PRZ%)
   :ENDPROC
340 PROCWINDOW(PRZ%)
   :DEL%=DEL%-1

```


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From Page 136

```

:PROCDEL
:ENDPROC
350 DEF PROCINIT
:MHI%=MHI%+1
:LI6%=0
:LI62%=0
:MIA%=-1
:PRES%=BAPRES%
:X%=0
:Y%=424
:PR%=0
:YS%=10
:XS%=30
:PROCMISET
:PRDES%=0
:FOR NX=0 TO 4
:HO%(NX)=RND(3)
:PRDES%=PRDES%+HO%(NX)
:NEXT
:Q%=PRDES%
:MILOC%=MILOC%-1-10*(MILOC%=-1)
:PLRG%=PLRG%-1-1*(PLRG%=5)
360 IF MILOC%=0MILOC%=1
370 ENDPROC
380 DEF PROCMISET
:MIA%=-1
:MI%=1170+XS%
:MI2%=254+YS%
:MI3%=1170
:MI4%=254
:MIS%=XS%
:MIS2%=YS%
:MILOC2%=RND(MILOC%)
:IF MILOC2%=1MI4%=MI2%
390 ENDPROC
400 DEF PROCDELAY(X)
:TIME =0
:REPEAT UNTIL TIME =X
:ENDPROC
410 DEF PROCHOUSE(X,Y)
:MOVE X,Y
:GCOL 0,2
:DRAW X,Y+100
:PLOT 85,X+200,Y
:PLOT 85,X+200,Y+100
:GCOL 0,3
:DRAW X+100,Y+150
:PLOT 85,X,Y+100
:CH=RND(2)-2
:CH=-25*(CH)-125*(CH=0)
:GCOL 1,1
:MOVE X+CH,Y+100
:DRAW X+CH,Y+150
:PLOT 85,X+CH+50,Y+100
:PLOT 85,X+CH+50,Y+150
420 MOVE X+50,Y+50
:GCOL 0,0
:DRAW X+50,Y+82
:PLOT 85,X+82,Y+50
:PLOT 85,X+82,Y+82
:GCOL 0,0
:MOVE X,Y+32
:PRINT ;HO%(X/210)
:ENDPROC
430 DEF PROCSCREEN
:FOR NX=0 TO 840STEP 210
:PROCHOUSE(NX,0)
:NEXT
440 GCOL 0,1
:FOR NX=200 TO 208STEP 4
:MOVE 1120,NX
:DRAW 1280,NX
:NEXT
:MOVE 1152,264
:VDU 229,230,233,234,10,8,8
,8,8,231,232,235,236
450 PROCTM
:COLOUR 1
:VDU 4
:PRINT "Presents : ";PRES%
:PRINT "Score : ";SC%
:PRINT TAB(17,1);"%age delivered
: 100"
:MOVE 0,896
:DRAW 1280,896
:MOVE 512,1008
:DRAW 512,944
:DRAW 1248,944
:DRAW 1248,1008
:DRAW 512,1008
460 VDU 5,19,1,7,0,0,0,19,3,1,0
,0,0,19,2,6,0,0,0
:ENDPROC
470 DEF PROCTM
:IF NOT MIA%ENDPROC
ELSE MOVE 1170,254
:GCOL 0,0
:PLOT 1,XS%,YS%
:YS%=RND(10)+3
:XS%=(40-YS%)
:GCOL 0,1
:MOVE 1170,254
:PLOT 1,XS%,YS%
:ENDPROC
480 DEF PROCMI
:IF NOT MIA%GOTO 610
ELSE IF MILOC2%=1GOTO 730
490 GCOL 0,0
:MOVE MI%,MI2%
:DRAW MI3%,MI4%
:MI%=MI%+MIS%
:MI3%=MI3%+MIS%
:MI2%=MI2%+MIS2%
:MI4%=MI4%+MIS2%
500 MOVE MI%,MI2%
:GCOL 0,1
:PMX%=POINT(MI%-4,MI2%+4)
:IF PMX%=0DRAW MI3%,MI4%
:ENDPROC
ELSE IF PMX%=-1AND RND(PLRG%)=1
PROCPLSET
:ENDPROC
ELSE IF PMX%=-1SOUND 0,3,6,1
:PROCMISET
:ENDPROC
ELSE IF PMX%<>2GOTO 600
510 GCOL 0,0
:MOVE X%,Y%
:VDU 226,227,228
:FOR M%=0 TO 5
:SOUND &10,2,4,1
:FOR NX=1 TO 3
:GCOL 0,NX
:MOVE X%+NX*4,Y%+NX*4
:VDU 237,238,239
:GCOL 0,0
:MOVE X%+NX*4,Y%+NX*4
:VDU 237,238,239
:NEXT
:NEXT
520 VDU 4
:PRINT TAB(10,10);"Failure !!
The end of""TAB(10);"Christmas
as we know it"
:CO%=TRUE
:PROCTUNE(2)
:PROCDELAY(100)
:VDU 21
:ENDPROC
530 VDU 6,22,7,23;8202;0;0;0;0;
:IF SC%>HI%(4,0)GOTO 570
540 CLS
:FOR NX=0 TO 1
:VDU 129,157,135,141
:PRINT TAB(10,NX);"** ** Top
5 ** **"
:NEXT
:PRINT TAB(8);"Name Score
%age"
:FOR NX=0 TO 4
:PRINT TAB(8,NX*2+5);NX+1;"";HI%
(NX);TAB(18,NX*2+5);HI%(NX,0);
TAB(25,NX*2+5);HI%(NX,1)
:NEXT

```


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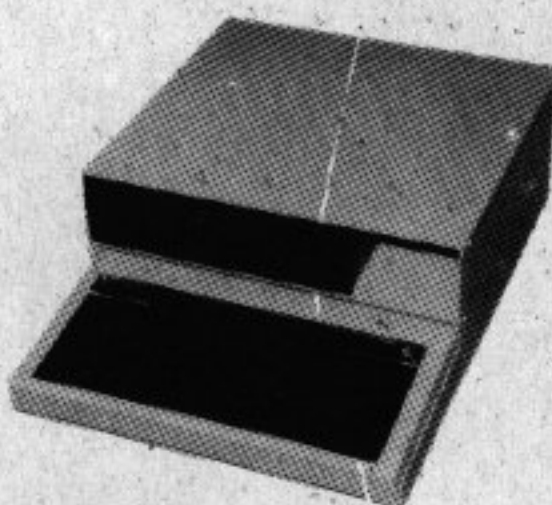
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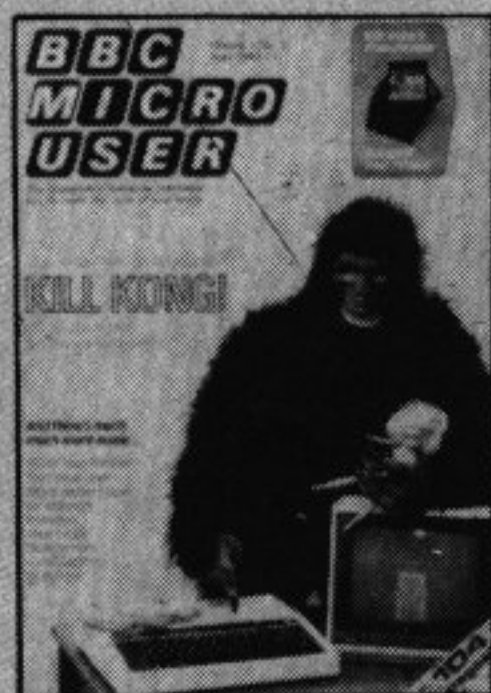
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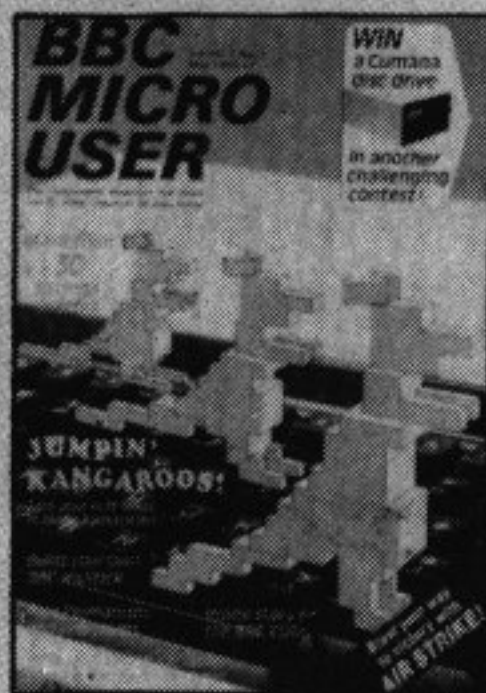
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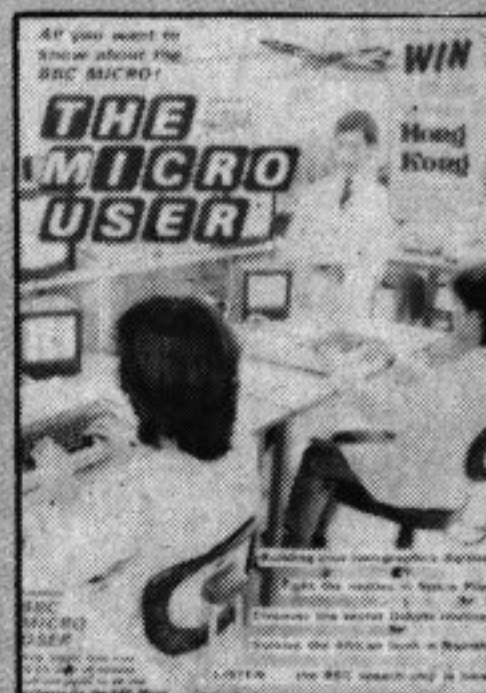
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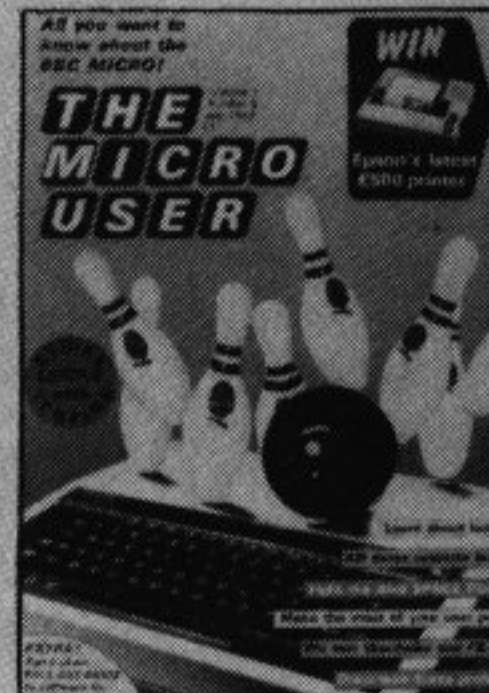
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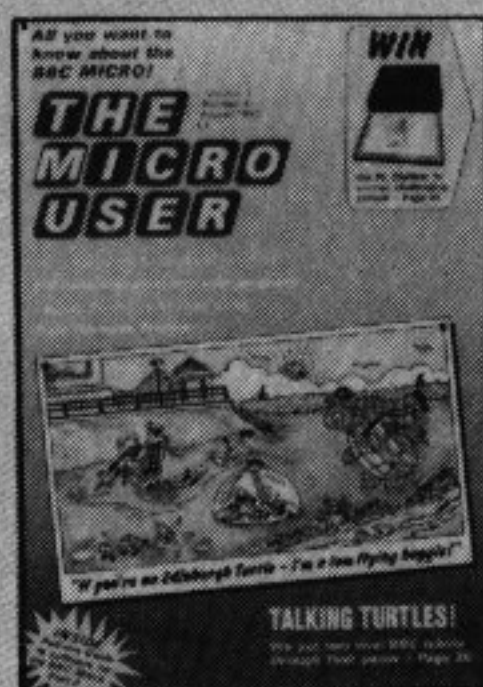


July issue

Beginners: loops. Ten Pins listing. Editing course: the PRINT statement. Graphics course: creating sunburst effects. Structured programming, Part 3. How to use the user port to maximum effect. Space Pods listing. Wordwise review. Epson FX80 printer review. The BBC Micro as a sophisticated design tool. Hexadecimal highlights. How to edit with impunity, and fix that break key.

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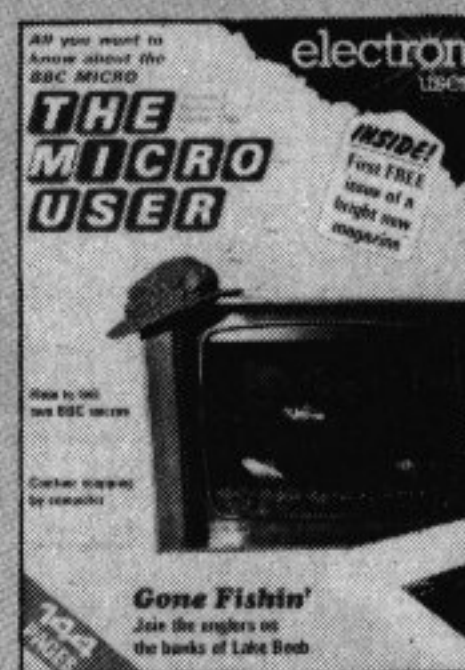
August issue

Beginners: more help on loops. BBC Micro User's Manchester show reviewed. Animation, Part 1. BBC Buggy and Edinburgh Turtle reviewed. Techniques for switching from tape to disc. Structured programming, Part 4. Inside King Kong: case study of the popular game. Fruities listing. A guide to logical operators. Machine code routines to give Mode 7 colour. Build your own dual cassette system.



September issue

Animation Part 2. Editing course: use of TAB. Turn your BBC Micro into a graphics terminal. Galactic Invaders listing. Structured programming, Part 5. Two new DFS and APTL Eprom blower reviewed. Control the outside world safely with your BBC Micro. Robin and Marian listing. Workshop: variable storage explained. Beeb-calc investigated. Inside the Electron: Acorn's latest micro reviewed.



October issue

Graphics: How to draw circles. Fishing. Structure, the last of the series. Format: We update the program. Make a light pen with Body Building Part 8. Editing: Print fields. The Hobbit reviewed. Workshop: Add joysticks to your games. Link Up: Join two BBC Micros. For... NEXT loops in Beginners' Part 7. Contour plotting program. Basiccode, a computer communications language.



November issue

Beginners: guide to character codes. Light Pen, more useful software. Forth ROM reviewed. Blackjack, a compulsive simulation of the card game. Putting Basic programs into sideways ROMs. Goblins, a fun packed enchanted journey. Body Building Part 9, projects for the Physics lab. The SOUND command explained, Part 1. Games design: improve your programs.

From Page 139

```

550 PRINT "*****" Press <SPACE>
    to play again"" or <ESCAPE>
    to see instructions"
:REPEAT PRINT TAB(0,5);CHR$(
RND(7)+128)
:UNTIL INKEY (-99)
:IF V%<>0PROCUNE(0)
560 GOTO 110
570 NZ=-1
:REPEAT NZ=NZ+1
:UNTIL SC%>HI%(NZ,0)
:IF NZ=4GOTO 580
ELSE FOR MZ=3TO NZSTEP -1
:HI$(MZ+1)=HI$(MZ)
:HI%(MZ+1,0)=HI%(MZ,0)
:HI%(MZ+1,1)=HI%(MZ,1)
:NEXT
580 FOR MZ=0TO 1
:PRINT TAB(6,10+MZ);
:VDU 129,157,134,141
:PRINT "You are in the top 5
    ";CHR$ 156
:NEXT
:PRINT ""Please enter your name
: - ";
:*FX15,0
590 VDU 31,32
:INPUT A$
:HI$(NZ)=LEFT$(A$,7)
:HI%(NZ,0)=SC%
:HI%(NZ,1)=INT ((DEL%/TP%)*100)
:GOTO 540
600 MOVE PRX%,PRY%
:VDU 18,0,0,224,8,225
:PRX%=0
:PROCMISET
:PROCPREZ
:DEL%=DEL%-1
:PROCDEL
:ENDPROC
610 GCOL 0,0
:MOVE RP%,RP2%
:VDU 240,241,242,243,10,8,8
,8,8,244,245,246
:RP%=RP%-32
:RP2%=RP2%+RND(9)-5+4*(RP2%>Y%)-4
*(RP2%<Y%)
:GCOL 0,1
:MOVE RP%,RP2%
:VDU 240,241,242,243,10,8,8
,8,8,244,245,246
620 IF POINT(RP%,RP2%-16)=20R
POINT(RP%,RP2%-28)=20R POINT(RP%
,RP2%-36)=20R POINT(RP%,RP2%-48)=
20R POINT(RP%+48,RP2%-64)=2
OR POINT(RP%+24,RP2%)=26GCOL 0
,0
:MOVE RP%,RP2%
:VDU 240,241,242,243,10,8,8
,8,8,244,245,246
:GOTO 510
630 IF RP%<=0GCOL 0,0
:MOVE RP%,RP2%
:VDU 240,241,242,243,10,8,8
,8,8,244,245,246
:PROCMISET
640 IF RND(10)=1GOTO 650
ELSE ENDPROC
650 GCOL 0,1
:SOUND &12,V%,40,0
:SOUND &10,V%,3,10
:MOVE RP%,RP2%-32
:PLOT 21,0,RP2%-32
:GCOL 0,0
:PLOT 21,RP%,RP2%-32
:IF Y%-32<RP2%-32AND Y%>RP2%-32
AND X%<RP%GOTO 510
660 ENDPROC
670 DEF PROCSCORE(I%)
:VDU 4
:SC%=SC%+I%
:PRINT TAB(8,2);SC%
:VDU 5
:ENDPROC
680 DEF PROCPREZ
:VDU 4
:PREZ%=PREZ%-1
:PRINT TAB(11,0);PREZ%;" "
:VDU 5
:ENDPROC
690 DEF PROCWINDOW(I%)
:GCOL 0,1
:IF I%=-1GCOL 0,0
:I%=LIG2%
ELSE SOUND 3,3,0,1
:LIG%=10
:LIG2%=I%
700 I%=INT (I%/210)
:I%=I%*210
:MOVE I%+50,200
:VDU 248,249,250
:MOVE I%+50,50
:DRAW I%+50,82
:PLOT 85,I%+82,50
:PLOT 85,I%+82,82
:MOVE I%+50,82
:VDU 18,0,0,247
:MOVE I%+50,200
:VDU 248,249,250
:GCOL 0,3
:MOVE I%+200,100
:DRAW I%+100,150
:PLOT 85,I%,100
:ENDPROC
710 DEF PROCDEL
:TP%=TP%+1
:VDU 4
:DEL%=DEL%+1
:PRINT TAB(34,1);INT ((DEL%/TP%)*
100);" "
:VDU 5
:ENDPROC
720 DEF PROCPRNO(I%)
:Q%=Q%-1
:I%=INT (I%/210)
:HO%(I%)=HO%(I%)-1
:GCOL 0,2
:MOVE I%*210,32
:PRINT ;HO%(I%)+1
:GCOL 0,0
:MOVE I%*210,32
:PRINT ;HO%(I%)
:MOVE I%*210+HO%(I%)*50+36,32
:VDU 18,0,1,224,8,18,0,3,225
:ENDPROC
730 GCOL 0,0
:MOVE MI%,MI2%
:DRAW MI3%,MI4%
:MI%=MI%+MI$%
:MI3%=MI3%+MI$%
:MI4%=MI4%-MH%*(MI2%<Y%)+MH%*(MI2
%>Y%)
:MI2%=MI2%-MH%*(MI2%<Y%)+MH%*(MI2
%>Y%)
:GOTO 500
740 DEF PROCINSTRUCTIONS
750 VDU 22,7,23;8202;0;0;0;0;
:FOR NZ=0TO 1
:VDU 129,157,135,141
:PRINT TAB(10,N%);"Santa's Saucer
"
:NEXT
:PRINT "" With the modern day
population,Santa ishard pressed
to deliver to the chimneys"
760 PRINT "of the world,so he has
dispensed with the traditional
reindeer,and hired a saucer
to help with his deliveries."
770 PRINT " The international reindee
r union has formed a action
group to prevent Santa doing
his rounds.Some of them with
homicidal tendencies have

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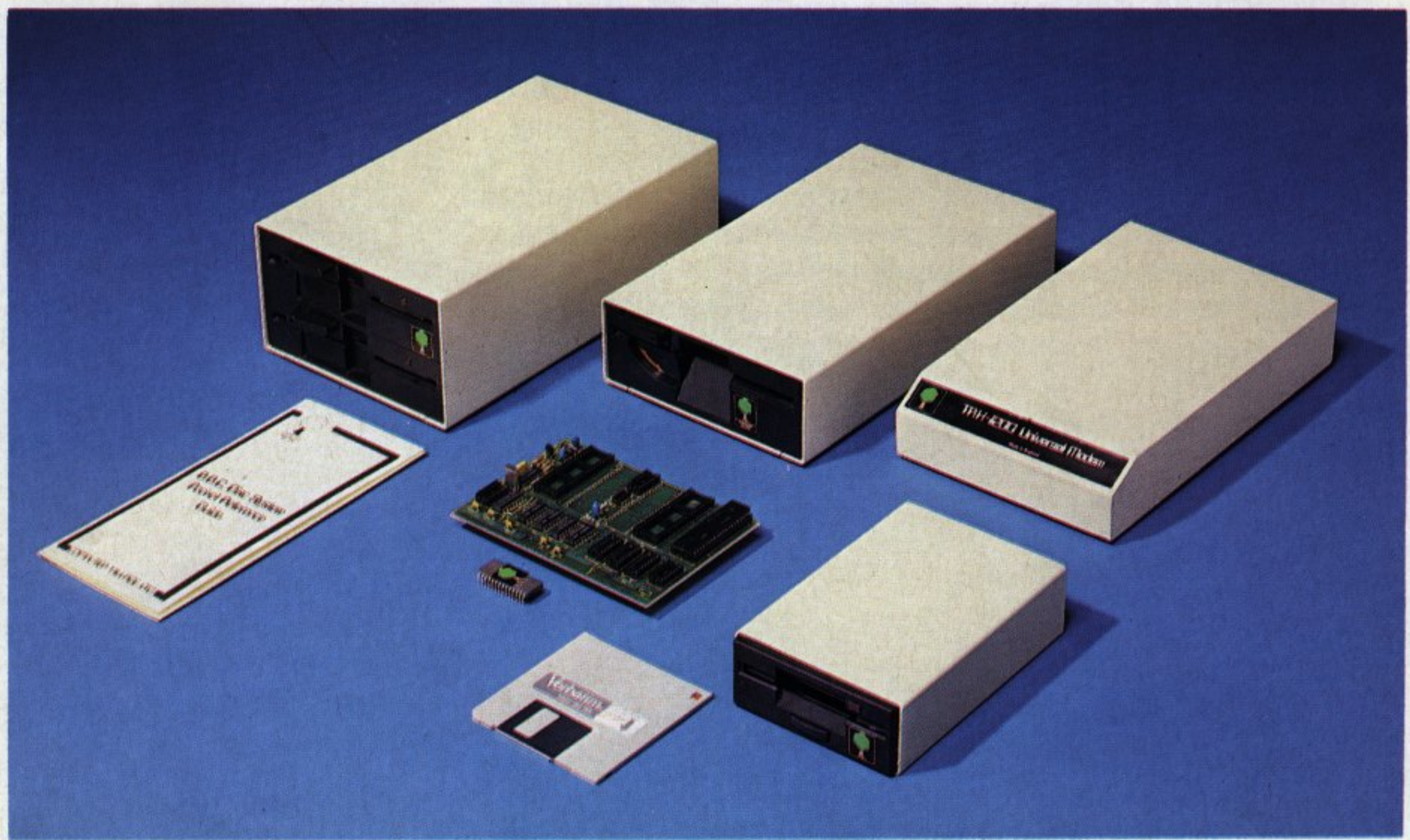


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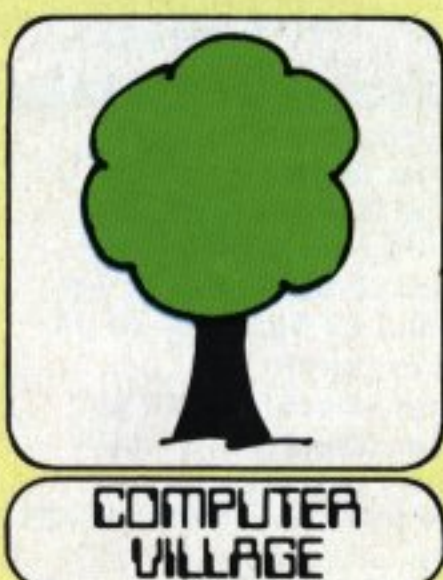
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From Page 142

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:A=A-48
ELSE GOTO 820
830 IF A=1V%=-15
:V1%=126
ELSE IF A=2V%=-10
:V1%=80
ELSE V%=0
:V1%=0
840 PRINT "'** ** Press SPACE BAR
to start ** **"
:REPEAT UNTIL INKEY (-99)
:IF V%(>)OPROCTUNE(0)
:ENDPROC
ELSE ENDPROC
850 DEF PROCTUNE(I%)
:IF I%=0RESTORE 890
ELSE IF I%=1RESTORE 880

```

```

ELSE IF I%=2RESTORE 900
860 READ L%
    :FOR N%=1TO L%
    :READ A%,B%
    :IF A%=0SOUND 1,0,0,B%
    ELSE SOUND 1,V%,A%,B%
870 NEXT
    :TIME =0
    :REPEAT UNTIL TIME =100
    :ENDPROC
880 DATA 5,149,6,157,6,165,6,169
    ,12,149,24
890 DATA 17,145,4,0,2,145,4,0,2
    ,145,8,0,2,145,4,0,2,145,4,0
    ,2,145,8,0,2,145,6,157,6,129
    ,8,137,3,145,16
900 DATA 7,53,8,37,8,25,8,65,8,57
    ,4,53,4,57,16
910 IF ERR =17GOTO 80
    ELSE MODE 7
    :REPORT
    :PRINT " at line ";ERL

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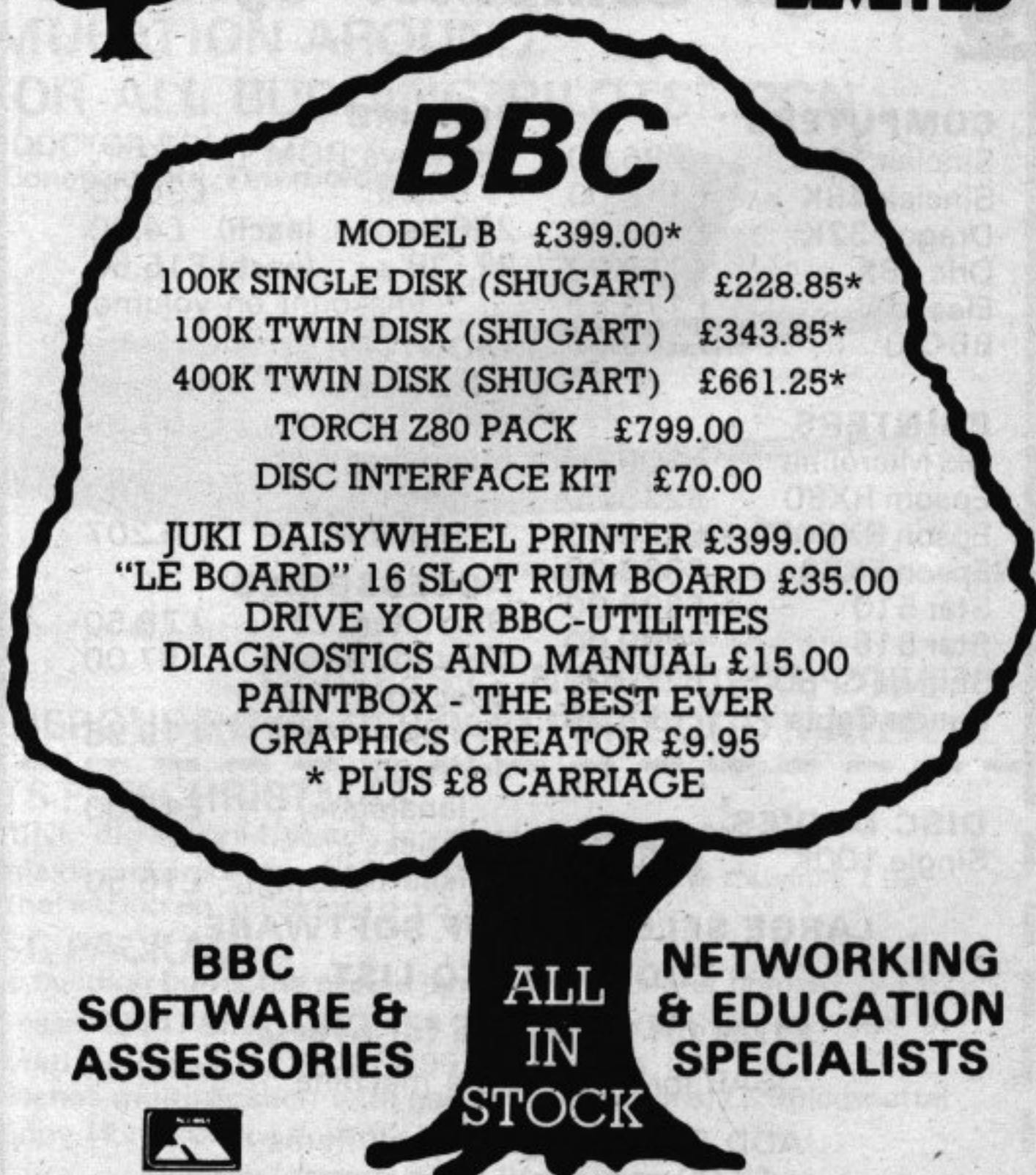
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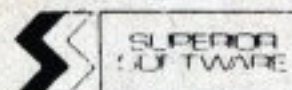
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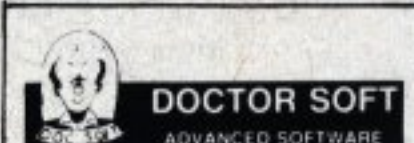
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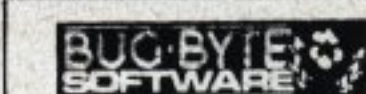
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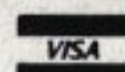
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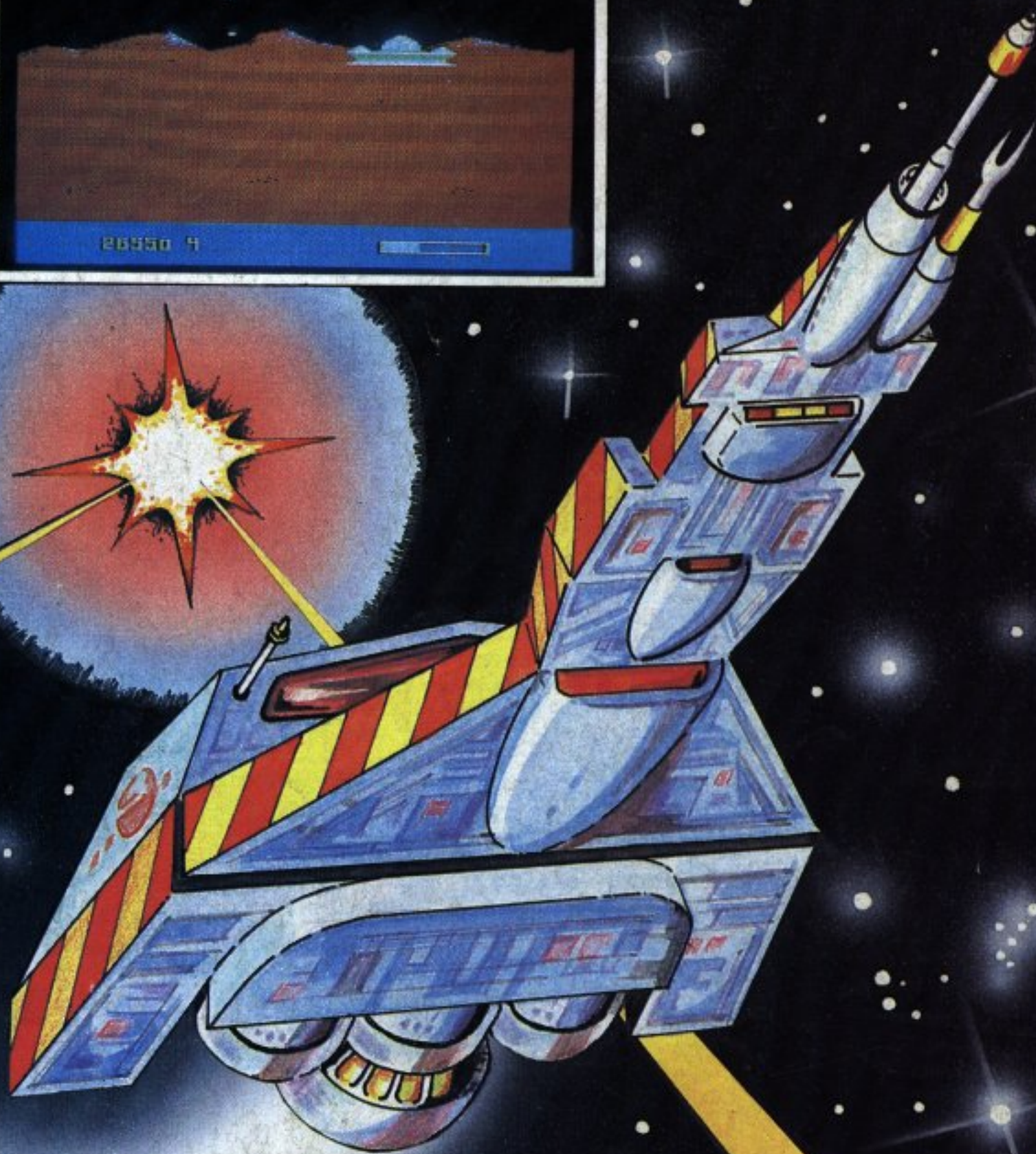
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